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ETHYL BROMIDE.

By Lawrence Wolff, M. D.

Read at the Pharmaceutical Meeting April 20.

Progressive medicine has again confronted the pharmacist in this substance with a new remedial agent, which promises fair to stand the test of time much better than the host of new remedies which are almost daily pressed into the ranks of our therapeutic allies, and it is therefore I think it merits closer investigation, in order that it be offered to the medical profession in its highest possible perfection.

In view that already our literature shows a great deal of research and a thorough knowledge of the production of this new agent, I do not claim to here propose radical innovations, but merely desire to call attention to such modifications as will assist in obtaining it in its pure state at the lowest possible price.

Ethyl bromide, the hydrobromic ether of older chemists, discovered by Serullas in 1827, shortly after the discovery of bromine itself, received but little attention as a therapeutic agent until Dr. Nunnelly, of Leeds, England, called attention to it as a useful anæsthetic in 1865. Rabuteau, of Paris, again created considerable interest by his experiments with it on the lower animals in 1876, but the credit of bringing it out prominently and, as it now seems, permanently, is due to Dr. Lawrence Turnbull and the hearty co-operation, persevering efforts and experiments of Dr. R. J. Levis, both of this city. The latter has already used it in hundreds of cases, and as yet no untoward accident has occurred at his hands.

Its early preparation by the discoverer was based upon the action of phosphorus on bromine in presence of alcohol, which Personne, in 1861, modified by substituting amorphous phosphorus instead, and which was subsequently more rationally conducted by Prof. Remington. The process of De Vrij, by decomposing potassic bromide with sulphuric acid in presence of alcohol, was an improvement which was

followed out by Dr. Greene, but which never served me, in the proportions mentioned, to obtain any appreciable quantity of the ethyl bromide.

Its chemical composition was early determined to be C_2H_5Br, its specific gravity 1·40, and its boiling point 106°F.; it will not burn, and its vapors even will extinguish flame.

Finding considerable objection to the product of the earlier process on account of its alliaceous odor, probably due to free phosphorus or an ethyl phosphide, I was soon led to produce it by De Vrij's method, which, however, I found deficient in the amount of sulphuric acid, and it was not until I had almost trebled its quantity that I succeeded in completely converting the entire amount of alcohol into ethyl bromide.

The process I employed and, after various experiments and modifications found to answer best, is as follows:

24 ounces of potassic bromide, coarsely powdered, are added to a mixture of 64 ounces of sulphuric acid and 32 ounces of water. After the mixture has sufficiently cooled, 16 fluidounces of alcohol (95 per cent.) are added thereto, the whole placed in a large flask contained in a sand-bath and connected with a Liebig's condenser, heat applied sufficiently that the contents of the flask should be at about 200°F., and there to be maintained until the reaction, which will go on quite lively for a while, shall have ceased, and the ethyl, which has rapidly been gathering in a receiver containing about one ounce of water, has ceased to come over, as can easily be detected when it fails to further sink to the under surface of the layer of water. The ethyl bromide so obtained will amount to about 20 ounces, and should be shaken with a solution of potassic bicarbonate, subsequently washed with water and purified by redistillation, as described below.

The chemistry of this proces is quite plain, the sulphuric acid forming acid potassium sulphate, the bromine taking the place of the oxygen in the ethyl oxide, forming water with the hydrogen present, which expressed in symbols would read as follows:

$$KBr+H_2SO_4+C_2H_6O=KHSO_4+H_2O+C_2H_5Br.$$

The operation is in itself so simple, so rapid and so totally devoid of all danger, that its advantages over the earlier ones are readily obvious. It can easily be conducted on the laboratory table of most any pharmacy, and will yield a product which possesses all the characteristics as described above. Its cost is an item of the greatest importance to the pharmacist, in view of the very high price asked for it at one time,

and perhaps yet. The potassic bromide at 68, the sulphuric acid at 15, and the alcohol at 30 cents, will make the expense for material per pound only 90 cents, while any young man can make this amount in two hours' time, besides attending to his various other duties, and it will enable him to emancipate himself from the manufacturing chemist, adding by it to his self-esteem and the elevation of his profession.

But when larger quantities are required, and when it is a matter of importance to reduce the price as much as possible, I have found it to advantage to deviate from the above process, which, however, to the pharmacist may prove most suitable for its preparation on a small scale.

As the first step in the manufacture of potassic bromide is that of ferrous bromide, I made use of the latter at once to obtain the desired ethyl in the following manner:

In a stone jug containing about 1 gallon of water and 2½ pounds of iron turnings or wire, 5 pounds of bromine are gradually added, care being taken not to allow the temperature to rise too high, the jug besides being placed in cold or iced water, and as soon as the reaction has ceased the solution of the green ferrous bromide is filtered off, the remaining iron being well washed out with warm or boiling water, and to it, in a leaden or glass flask (I have found the acid globe of a carboy a most useful vessel), 15 pounds of commercial sulphuric acid are added; after the mixture has sufficiently cooled, 6 pints of alcohol (95 per cent.) are intermixed, the mixture well agitated and distilled at a temperature as in the before-mentioned operation. I have in this way obtained from these amounts 7 pounds ethyl bromide at a cost of material of not over $4.30, or about 60 cents per pound.

Again, in this reaction the chemistry is quite simple, the sulphuric acid uniting with the iron to form ferrous sulphate, while the two bromine again take the place of two oxygen in the two ethyl oxide, the four hydrogen with the two oxygen of the ethyl oxide forming two water, and may be expressed in symbols as follows:

$$FeBr_2 + 2C_2H_6O + H_2SO_4 = FeSO_4 + 2H_2O + 2C_2H_5Br.$$

Although the ethyl bromide thus obtained is by far purer and has less odor than most of the articles found in the market, I have observed that, on evaporating a quantity of it, it left a heavy acrid odor behind which in anæsthesia was bound to prove objectionable if not actually deleterious, and I concluded, therefore, that, after washing, I would re-distill it at a low temperature, which I effected by placing it in a gallon bottle contained in a water-bath and connected with a condenser.

The bath was heated to a temperature of not over 125°F., at which brisk ebullition ensued and a stream of pure ethyl bromide was received, a sample of which I here exhibit, which is devoid of any and all disagreeable odor, colorless and limpid, of a specific gravity of 1·40, boils at 106°F. and does not burn.

The remains in the bottle were about one-half ounce of a brown acrid liquid, which I here exhibit, but of which I have not yet recovered a sufficient amount to make a more complete examination. To the taste it is extremely unpleasant, pungent and representing the disagreeable odor generally found in the ethyl bromide offered in the market.

As regards the stability of pure ethyl bromide, which has been questioned, I can fully confirm Dr. Levis' experience. I have kept samples of my earlier experiments, made almost two months ago, which to-day present the same appearance they had then; and far from a spontaneous decomposition, I have not succeeded, by either alkalies or acids, or other chemical means, to liberate the bromine from this ethyl or to effect its exchange in double decomposition,[1] and cannot say, therefore, that it deserves the name of a loosely molecular article. (Dr. Squibb, "Medical Record," April 3d, 1880, p. 379).

In concluding my remarks on its manufacture, I would point out the simple and cheap manner in which, by my process, a pure and reliable article (which already has been thoroughly tested by many physicians) can be produced by the pharmacist himself, without having to submit to the exorbitant prices generally asked for it.

Actuated by a desire to further study the effects of the ethyl bromide, I was led to make a series of experiments on the lower animals and on ourselves, conjointly with my friend Dr. J. G. Lee, the physician to the Coroner of this city. Regarding the safety of it as an anæsthetic, as well as to after effects produced by its use, we made numerous investigations, the results of some of which I will give condensed below.

As an article from the pen of Dr. J. Marion Sims seems to indicate that a most disastrous result has recently occurred from its use ("Medical Record," April 3, 1880, p. 361), and that being the only and first instance of the kind reported, the ethyl bromide used in that case, as well as the most of it produced heretofore, was presumably obtained in a very imperfect manner, and it seems but reasonable to review the case.

That death occurred only twenty-one hours after the use of the

[1] I have since observed a reaction with a strong solution of ammonia, yielding ethylamine bromide.

anæsthetic seems to imply that it was not its immediate presence which caused this lethal effect. The presence of an odor of ethyl bromide forty-one hours after its administration is hardly in conformity with its volatile character, but seems to point to the presence of a heavier and less diffusible substance contained therein.

Judging from these facts that the deleterious effects might be due to the heavy distillate above mentioned, we gave 20 drops of it to a rabbit, with the result of causing gastro-intestinal irritation, general malaise and subsequent death in 18 hours afterwards; while, in the same animal, 30 drops of pure ethyl bromide, given on a previous occasion, produced no worse effects than slight intoxication. A *post mortem* examination showed the decided odor of the acrid heavy distillate pervading the intestinal tract and kidneys, while the brain, which unfortunately in the autopsy of Dr. Sims' case has not been mentioned, presented a congested appearance, explaining probably the cerebral trouble which Dr. Sims' patient complained of so much. This congestion is totally absent in immediate death produced by the anæsthetic on animals, the brain in such contingencies being generally pale and somewhat anemic. The abdominal viscera also showed signs of irritation and congestion.

To further satisfy ourselves as to the effects of pure ethyl bromide, we continued our experiments as follows.

A rabbit of 4 pound 3 ounces weight; anæsthesia induced in one minute by 20 drops of ethyl bromide; pupils first contracted and then dilated; heart acting well, with slight increase in number of beats. By withdrawing and reapplying the anæsthetic as required, the animal was kept under the effects of it for 20 minutes, and on withdrawing it the animal recovered entirely in five minutes.

Another rabbit, weighing 3¾ pounds, was made to inhale 1 drachm of ethyl bromide, producing complete anæsthesia in one minute, causing first contraction, followed by dilatation of the pupil; heart beating normally; voluntary muscles relaxed. The anæsthesia being pushed on by the use of another drachm of the ethyl, the beating of the heart was accelerated, number of respirations increased, and in six minutes heart ceased to beat, after losing preceptibly in impulse. Attempts at resuscitation proved fruitless, but electromotoric sensibility well preserved. *Post mortem* examination showed the brain in a state of anemia, lungs pale and healthy, right ventricle and auricle distended and filled with *ante mortem* clots; no odor of the ethyl perceptible after death.

The above experiments demonstrate that with the cautious use of ethyl bromide, rabbits, which are with difficulty maintained in anæsthesia, can be successfully ethylized without much danger to their lives.

Satisfied as to this, we were determined to obtain information as to its action when administered internally, and for that purpose gave to three of the animals respectively 10, 20 and 30 minims of the ethyl. While producing in the larger doses more markedly a slight intoxication, no other serious symptoms arose. Encouraged by this, we commenced taking it ourselves, well diluted, first in doses of 5 and 10, and then 25 and 30 drops, without discovering any noticeable effect, save that of slight sleepiness induced by the larger doses. A nervous headache, existing during these experiments, seems by the ethyl to have been entirely relieved, which however might have been the case had any other bromide been taken instead. That it may prove of decided benefit in nervous irritation and hysteria is readily to be inferred herefrom.

To the taste it is sweet and pleasant, but heating to the mucous surfaces, and it should be well diluted before it is administered.

The next case for experiment was that of a rabbit, which we injected hypodermically with 5 minims of the ethyl, producing, however, no marked effect, save a very slight intoxication. Another, subsequently injected with 10, 15 to another and 30 to still another, had again the effect of producing intoxication, with a decided somnolence and relaxation of the muscles, all of the animals recovering, however, completely within one hour. As a comparative experiment, another rabbit was injected with 15 minims of chloroform, which produced most marked and threatening effects and complete somnolence, from which the animal could not be roused, and only recovered after three hours, remaining for hours afterwards in a stupefied condition.

It is to be remarked here, that in all cases where the animals were injected with ethyl bromide the number of respirations were largely increased.

Determined to ascertain the manner in which the ethyl bromide should prove fatal if injected hypodermically, we injected into one of them, a healthy female rabbit of 5 pounds weight, within half an hour, in broken quantities, $2\frac{3}{4}$ drachms of the article, failing, however, to inflict death, nor more serious symptoms within the next three hours than those above noted; found, however, that the animal had expired during the following night.

A *post mortem* examination revealed a congested brain, but showed nothing beyond that to account for its death.

The inference from these experiments may be set down that, internally as well as hypodermically, the ethyl bromide has no toxic effect on the animal organism beyond that of ether or alcohol.

The absence of any odor of it in intestines, kidneys and liver admits the theory that it is totally eliminated through the lungs; that by its presence in large quantities in the system, and if not readily eliminated through the lungs, it acts as a decided stimulant, and may, when used in excess, like ether and alcohol, cause death by cerebral congestion.

Finally, and with a view to test its adaptability and safety as an anæsthetic in comparison with ether and chloroform, we experimented on three healthy rabbits of about the same weight, simultaneously administering by inhalation to one ether, ethyl bromide to another and chloroform to the third, sufficiently being used to maintain profound anæsthesia.

The first one, under ether, was completely under its effect in one minute; heart's action rapidly increased in number of beats, diminished in impulse, death occurring in 3 minutes.

The second one was in complete anæsthesia from ethyl bromide in 30 seconds; pupils first contracted then dilated; muscles relaxed; accelerated action of heart, gradually failing impulse; death in 7 minutes.

Third rabbit received chloroform, producing rapidly anæsthesia in 50 seconds; heart feeble; at the expiration of 1 minute 50 seconds heart suddenly ceased to beat.

Post mortem appearance showed the animal killed by ether presenting congested membranes and investments of brain, heart apparently arrested in diastole, clot in right auricle and ventricle, which were largely distended; odor of ether thought to be faintly perceptible on opening abdominal cavity; *post mortem* hypostasis well marked in lungs.

Rabbit died of ethyl bromide presented on *post mortem* examination a brain somewhat paler than normal, clots in both ventricles and auricles of heart; death apparently from overstimulation of this organ; lungs normal; no odor of the ethyl perceptible in viscera.

Chloroformed animal showed on *post mortem* examination an anæmic brain, small clots in right auricle and ventricle, heart apparently arrested in incomplete systole, due to clot; lungs markedly congested; no odor of chloroform noticeable.

The inferences from these cases seem to impress us as follows:

The first and second rabbits, which had been treated with respectively ether and ethyl bromide, died under similar circumstances. The modes of death appear to have been occasioned by a gradual paralysis of the cardiac inhibitory motor centres, while the sudden heart failure in the third, which is typical of chloroform accidents, seems to indicate paralysis of the cardiac motor centres.

While it is hardly justifiable to infer from experiments on animals as to the effect on the human organism, it is not to be denied that they go far, along with the many trials on human beings and those upon ourselves, to show that a direct toxic influence from pure ethyl bromide on the organism need not be apprehended.

That pure ethyl bromide is *per se* an absolutely safe anæsthetic can as yet not be positively stated, but that its action appears to be quite as safe as ether, and certainly more so than the treacherous and dangerous chloroform, seems to us, as deduction from above-related experiments, out of question.

We can certainly hail this new-comer as another agent destined to alleviate sufferings, which, by its own merits, will win its way into the ranks of those we now hold as recognized measures for combating disease, and as such, propose that by this body it be recommended for a position in the National Pharmacopœia about to be revised.

Philadelphia, April, 1880.

BROMIDE OF ETHYL (Hydrobromic Ether).

By Joseph P. Remington.

Read at the Pharmaceutical Meeting, April 20.

This anæsthetic, which has attracted considerable attention lately, was the subject of a paper by the writer in 1877, which was read before the American Pharmaceutical Association at its meeting at Toronto, Canada. At that time the process which was recommended was a modification of that of Personne, and served well on the small scale to make the preparation experimentally; it was not expected that the demand would at any time be so great as to require a process adapted to a manufacturing scale; but the calls became so frequent that it was found necessary to devise a more practicable method than the one then recommended.

De Vrij's process,[1] which depends upon the decomposition of potassium bromide by sulphuric acid in the presence of alcohol, was again looked to as a basis for a working formula, and the process recommended by Dr. E. R. Squibbb[2] for preparing hydrobromic acid by distilling from a mixture of potassium bromide, sulphuric acid and water, suggested a plan by which the contamination of ordinary ether could be avoided, and this process was subsequently recommended by Dr. Greene.[3]

In a series of experiments intended to ascertain practically the process which could be adopted if it be deemed advisable to introduce the new agent into the U. S. Pharmacopæia, the following is selected as the best (cut of the apparatus will appear in the next number):

Potassium bromide (not powdered),	58 parts.
Sulphuric acid, sp. gr., 1·838,	44 "
Alcohol (clean) 95 per cent.,	44 "
Water,	28 "

Pour the water into a flask having double the capacity of the liquid ingredients above, and gradually add the acid; when the liquid has become cool add the potassium bromide, and having placed the flask in a sand-bath, adjust a thermometer, and with a bent glass tube connect the flask with a well cooled condenser, insert a narrow glass tube in the cork of the flask, and by means of a short rubber tube connect it with a narrow glass tube which is terminated by a syphon; the shorter limb of this syphon is inserted in the bottle containing the alcohol, which is elevated three feet or more above the flask. Heat the contents of the flask to 116°C., and having attached a screw pinch cock to the short rubber tube of the syphon, allow the alcohol to drop or flow in a small stream into the flask, carefully regulating the rate of flow so that the temperature should not fall below 100°C., nor rise above 116°C. When all the alcohol has passed into the flask continue the distillation until the temperature rises to 116°C., and then disconnect the receiving flask. Agitate the distillate with an equal bulk of distilled water, to which has been added five parts of solution of soda (or sufficient to render the liquid slightly alkaline), and when the mixture has clearly separated into two layers, pour off the upper-

[1] Watts' "Dictionary of Chemistry," vol. ii, p. 528.
[2] "American Journal of Pharmacy," March, 1878, p. 116.
[3] "American Journal of Pharmacy," June, 1879.

most layer, and having introduced the heavier liquid into a clean flask containing a few fragments of chloride of calcium, redistil it.

Bromide of ethyl is a colorless, very volatile liquid, not inflammable, having an agreeable odor, and a hot, saccharine taste. Its specific gravity is 1·420. It boils at 40°C. (104°F.). It is very sparingly soluble in water, freely soluble in strong alcohol and ether. When a small portion is evaporated from a porcelain plate by causing it to flow to and fro over the surface, little or no foreign odor is yielded as the last portions pass off, and the plate is covered with a slight deposit of moisture.

GUM-HOGG.

By Chas. L. Mitchell, Ph.G., M.D.

Read at the Pharmaceutical Meeting, April 20th.

Under the above title a peculiar form of gum is described in the U. S. Dispensatory, p. 1664; it was obtained from the establishment of Messrs. J. B. Lippincott & Co., where it was used in one of the processes for the manufacture of books. As described by Dr. Wood, "it is in lumps of various sizes, from that of a chestnut to that of a walnut or larger, of an extremely irregular shape, often much contorted, appearing frequently as if consisting of several pieces which had become agglutinated in their soft state, translucent and nearly colorless, with a slight reddish-yellow tint in some places, of a rather dull though somewhat shining surface, very hard, brittle, with a glassy fracture, inodorous and nearly or quite tasteless. With water it swells to a soft transparent mass, which retains this condition long without change, and if now stirred, instead of forming a consistent mucilage, breaks up into minute, irregular, transparent fragments, which retain this form indefinitely."

Chemically examined by Prof. Wm. Procter, Jr., it was found to be only very slightly soluble in water, both cold and hot, the solution giving a precipitate with sol. subacetate lead, but none with oxalate of ammonium, in the latter respect differing from gum arabic. The insoluble portion was dissolved by strong sulphuric acid, and was converted by boiling dilute sulphuric acid into a soluble gum. He considered the insoluble substance to be bassorin, the insoluble constituent of tragacanth, and the gum itself probably the same as Bassora gum. The gum was obtained from the East Indies, but its botanical source was unknown.

The attention of the writer was recently called to this article, and a few experiments and a number of inquiries made with a view to determine its true relation to Bassora gum. A quantity of the drug was accordingly obtained from the same house which furnished the specimens to Dr. Wood. Upon examination it does not present quite the same physical characteristics which are described by him, but appears to be more a collection of gums from different species bearing a general similarity to tragacanth. It occurs in fragments of irregular shape and varying from the size of a chestnut to much larger; its color in different samples varies from a dirty white to a yellowish brown; it is hard, inodorous, tasteless, and breaks with a short glassy fracture. Some fragments have still adhering portions of the bark of the tree from which it has been obtained, while the general appearance of the gum shows it to have been deposited in successive exudations, similar to tragacanth.

A portion of the gum was set aside with a quantity of cold water, when, after the expiration of twenty-four hours it had swollen up into a soft, white, transparent mass, occupying the lower half of the vessel. When agitated, this mass showed no disposition to form a uniform mucilage, but separated into small, soft, transparent, and rather granular fragments resembling pounded ice; this subsided to the bottom of the vessel again when it was set at rest. The whole was now thrown on a filter, and the filtrate examined; it gave a very faint precipitate with sol. subacetate lead, and no reaction whatever to solution oxalate ammonium; it was neutral in reaction and had neither taste nor smell.

A second portion of the gum treated by prolonged boiling with water gave the same result as obtained with cold water. The insoluble portion was next examined. Alcohol and ether had no solvent action upon it; boiled with dilute sulphuric acid it was soon dissolved, the resulting solution showing no reaction with tincture of iodine, and not responding to Trommer's test for sugar. When boiled with a weak solution of an alkali or alkaline carbonate it was speedily converted into a uniform thick mucilage of a pinkish color. When this was treated with an acid it did not again precipitate, although the mucilage lost its color and became perfectly transparent. The loss of color may be probably accounted for by the presence of iron in very small quantity. These tests, with the exception of perhaps the last, on which there is little information, correspond with those for bassorin, and show the close similarity of the present gum with that previously described by Dr.

Wood, and to the Bassora gum of other writers, and they are all probably identical and the same.

While the solubility of bassorin in alkaline solutions has been but briefly alluded to in various works, it seems to indicate certain properties which might almost entitle it to be considered as an acid similar in its nature to the arabic or gummic acid of gum acacia.

Its commercial history is quite interesting. It was brought into this country about thirty years ago at Salem, Mass. At that time Salem was the headquarters of the East India trade, and this gum came with a lot of tragacanth imported to that place from Calcutta. It was supposed that it might be used in place of tragacanth as a cheaper article by the shoe manufacturers of Lynn and others. It came, however, into the hands of a noted drug-garbler of the place by the name of Whipple, and was rejected by him immediately as an unsuitable and inferior gum. It was next shipped to Boston for sale, and after a number of ineffectual attempts to foist it on the market (for its worthlessness soon became known), was finally put up at public auction and sold for two or three cents a pound to Geo. Loring, at that time one of its principal booksellers. Mr. Loring made a number of ineffectual attempts to utilize it for different purposes, and finally, rather disgusted, placed it in the hands of a Prof. Jackson, a chemist of Jamaica Plain (one of the suburbs of Boston). Prof. Jackson experimented with it for some time, and discovered its property of forming a good non-adhesive mucilage when boiled with an alkali, and being quite intimate with Mr. Loring, they soon utilized it for the manufacture of marbled paper, which was just then commencing to be known in the country. Gradually the secret became known, and as there was a slight demand for the article, at different times small lots were brought into the country. Up to the time of Jackson's experiments the gum had received no name, but afterwards it was known through the trade by the name of gum-hogg, and it is believed he gave it this name on account of its obstinacy in resisting the different efforts for its solution, and thus behaving like a well-known domestic animal of similar perverse and wilful habits.

The different gums varied very much in price, being at various times from 25 cents to $1.25 per pound, and I have been informed by those who have used the article for a number of years, that the character and similarity of the specimens varied as much as its price. They all seemed, however, to have a certain resemblance to tragacanth. The

mucilage formed by this gum possesses no adhesive qualities, and thus is well fitted for its peculiar use, although not superior to similar mucilages obtained from flaxseed, elm bark, quince seed, etc.

Of late years, it has gone considerably out of use on account of the irregularity and scarcity of the supply, being substituted by some of the other mucilages before mentioned.

From all these facts, the writer concludes, that gum-hogg is not the product of any particular tree or plant, but is a *trade-name* applied to various cheap and inferior gums, all probably identical with Bassora gum, and containing and consisting almost entirely of bassorin.

In this connection, before concluding, it might be interesting to give a short account of its use in the manufacture of books. The process in which it takes a part is, that of "marbling," as it is termed, which consists of staining paper and the edges of books in a peculiar and variegated manner. The gum is first allowed to soak in cold water until swollen, and then boiled with a weak solution of pearlash until a thick consistent mucilage is obtained, which is strained. This forms the basis or vehicle for receiving the colors and transferring them to the paper, and is placed in a shallow tank on legs; the tank being about five feet long, three feet wide, and four inches deep. This body must be renewed as often as fermentation in the mucilage renders it liquid; in cold weather this is not so frequent, but in hot weather it must be replaced with fresh at least twice daily. The colors used are the ordinary paint colors, ground to a cream with thin mucilage of gum arabic. The workman, standing over the tank, first takes a large brush with spreading bristles, and dipping it in his color, sprinkles it over the surface of the tank by twirling the handle between his hands. The value of the mucilage is now shown, for the color does not either mix with it, or spread over its surface, but retains the circular form the drops would assume upon first striking a plane surface. The first color is then followed in a similar manner by a second, using a fresh brush, and this in turn by a third, and so on at the pleasure of the operator, each particular drop showing no disposition to mix with its fellow. The pattern thus made is mostly of round drops, but should it be desired to vary it, combs of different degrees of fineness are drawn in different directions gently over the surface, producing beautiful wavy lines and figures. The paper is now floated gently upon the surface of the tank for a few seconds, when the color is transferred from its surface to that of the paper, and after being hung to dry is burnished by hot steel rol-

lers. No particular quality of paper is needed, the only requisite being, it should not be too highly calendered. A smooth piece of board is now drawn over the surface of the tank when it is ready for a fresh operation. The edges of books are stained in a similar manner; the book being taken unbound and pressed between boards tightly together so that none of the color shall penetrate beyond its surface; they are afterwards when dry, burnished with a hot iron tool by hand. The products afforded by this process are of infinite variety, and, as can be imagined, no two products are ever exactly alike, and by varying the colors an almost endless and kaleidoscopic change can be produced.

Philadelphia, April 20, 1880.

IMPROVED TROCHE BOARD AND ROLLER.

By Francis E. Harrison, Ph.G.

From an Inaugural Essay.

The demand for troches having of late so largely increased, it has become necessary that we should seek some means of facilitating their manufacture. With a view to that end, I have devised an entirely new form of board, which I think will obviate the objectionable points of the one now generally in use. The present board is similar to that used by housekeepers as a bread or pie board, with the addition of two strips, one of which is tacked upon each side of the upper surface, within the range of the roller; so that when the medicated mass is rolled it will be reduced to the thickness of the space intervening between the roller and the board. Such an arrangement answers very well for troches of one thickness, but, as different troches vary in thickness, such a board is of only limited use, and it may be necessary to have a different one for each kind of troche; or, when using only one board, to change the strips in each case, unless the operator relies chiefly on his skill in rolling a mass to a uniform thickness without such mechanical guides.[1]

The following is a description of the troche board devised by me, upon which all sizes of troches can be made:

The Board is 16 inches long, 11 inches wide and $\frac{3}{4}$ of an inch thick; attached to it on the under surface are two beveled pieces, 11 inches in length, so as to run entirely across the board; these pieces are $\frac{1}{4}$ of

[1] An improved troche board was described by F. L. Slocum in "Amer. Jour. Phar.," 1879, page 589.—Editor.

an inch on one edge, tapering to $\frac{1}{8}$ of an inch on the other, and are firmly attached to the board, one on each end, the bevels both tapering in the same direction. The board is surrounded by a frame, 1 inch thick, 3 inches in height on the sides, and $2\frac{5}{8}$ inches upon the ends, so

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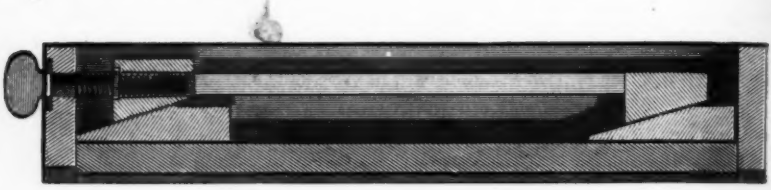
that the sides project $\frac{3}{8}$ of an inch above the ends. There is a second frame inside the outer one, and beneath the board, which is made to move back and forth in two grooves cut in the outside frame, one on each side; upon this inner frame there are two beveled pieces firmly secured, and corresponding to the strips attached to the board. When the inner frame is caused to move forward (by a screw which is fastened by a plate upon the frame) the beveled strips attached to the inner frame press against the beveled strips attached to the board, and by continued force the board is caused to ascend in the frame; by turning the screw in the opposite direction the frame is drawn back to its former position and the board falls again, in a horizontal direction. It is impossible for the frame to spring from its position, as it is firmly held by the grooves. The board may be taken out at will and cleaned after use. The beveled strips serve to keep the board from twisting. The board can be raised or lowered $\frac{3}{8}$ of an inch, the entire capacity; it requires 15 complete revolutions of the screw to raise it the entire distance, or 40 to the inch; by turning the screw but one-half of a revolution the board is raised $\frac{1}{80}$ of an inch, and, in fact, any desired

height may be obtained. This troche board forms a neat and attractive piece of furniture for the store, there being no projections to interfere with the working of it.



SECTION OF TROCHE BOARD.

The Roller is so constructed that the handle forms a continuous piece, running through a hole $\frac{3}{4}$ of an inch in diameter; thus the handles can be firmly held while the roller revolves. Upon each end of the roller there is a flange, $\frac{3}{8}$ of an inch high and 1 inch wide, keeping the roller in place upon the board, and preventing the surface of the roller from becoming soiled or bruised as the flanges raise it from the point of contact.

GLEANINGS FROM THE GERMAN JOURNALS.

BY LOUIS VON COTZHAUSEN, PH.G.

Mercury and Soft Paraffin.—E. Dietrich corroborates the statement of Dr. Weber, that mercury may be readily extinguished with vaselin under certain conditions, but states that under the same conditions an excellent ointment can be prepared with lard, simple cerate, old ointment, etc., which shows that vaselin, although much more expensive, possesses no advantages whatever over the other vehicles; on the contrary, old ointment is by far preferable, because the smallest quantity of it is required to kill the cohesion of the mercury, as can be proved by mixing 50 parts of it with 100 parts mercury, when it will yield quite an uniform and satisfactory ointment, which is not the case with any of the other vehicles, including vaselin.—*Pharm. Ztg.*, Feb. 28, 1880, p. 125.

E. Dietrich's New Mustard Plasters are spread on paper, shirting and silk, and are highly recommended by C. A. Jungclaussen, who states that while being fully as flexible as American mustard plasters, they are much quicker and energetic in their action. He further remarks, that by extracting an American mustard plaster with petroleum ether, decanting, and washing the residue, Dietrich

obtained as a residue 3·2 powdered mustard, deprived of its oil, while the decanted solution evaporated left a soft residue, which, when treated with acetic ether, yielded 0·167 caoutchouc and 0·5 fatty oil, thus proving that the powdered mustard used contained 13·5 per cent. objectionable fatty oil, which, in connection with the caoutchouc, increases the flexibility and adhesiveness of the plaster, but decreases its rubefacient power and promotes rancidity. Dietrich's improved method of preparation is not published by Jungclaussen, but probably differs from the American only in using mustard deprived of all its fixed oil.—*Ibid.*, Feb. 25, 1880, p. 117.

Dr. Heller's Caustic Pencils consist of long, thin sticks of lunar caustic, encased in wood; they look like ordinary lead pencils, and are resharpened like the latter whenever the point is worn off. A metal cap is used for protecting the point, when carried. The pencils are well adapted for cauterizing the throat, whenever the application of nitrate of silver is desired.—*Ibid.*, Feb. 11, 1880, p. 86.

Artificial Karlsbad Salt is made by Dr. Brunnengraeber by mixing 100 parts of sodium sulphate, 70 parts of sodium bicarbonate, 40 parts of sodium chloride and 5 parts of potassium sulphate, all coarsely powdered. This mixture is dispensed in bottles having a hollow wooden stopper, which, holding just 6 grams (which is sufficient for making 1 liter of Karlsbad Water), serves as a handy measure for the consumer.—*Pharm. Centralh.*, Feb. 26, 1880, p. 73.

Karlsbad Salt (see also "Amer. Jour. Pharm." 1878, p. 474; 1879, p. 454; 1880, p. 133).—*Genuine* Karlsbad Salt contains, according to *Ragsby:* Traces of potassium sulphate, 85 parts of crystallized sodium sulphate, 15 parts of crystallized sodium carbonate (probably sesquicarbonate), and 0·4 parts of sodium chloride.—*Artificial Karlsbad Salt* is made by *Schlickum*, in close imitation to the above by dissolving in 12 parts of lukewarm water: 1 part of sodium chloride, 1 part of sodium bicarbonate, 1½ part of neutral sodium carbonate, and 6 parts of crystallized sodium sulphate, decanting the clear liquid, setting aside at 8° to 10°C. for crystallization, and stirring several times while crystallizing; on decanting the first mother-liquor, dissolving in it 3 parts of Glauber salt, and again allowing to crystallize, a second yield is obtained.—*Pharm. Ztg.*, Feb. 14, 1880, p. 93.

Pure Hydriodic Acid.—C. Winkler dissolves iodine in carbon bisulphide in a tall glass cylinder, adds sufficient water, which forms a distinct layer on top of the deep violet-colored solution of iodine, and

passes a stream of hydrogen sulphide through the latter solution. The iodine is converted into hydrogen-iodide, and this is absorbed by the supernatant water, forming aqueous hydriodic acid, while the separated sulphur is dissolved by the carbon-bisulphide, forming a heavy oily solution. As soon as the violet solution of the iodine acquires a wine-yellow color the transformation is complete, the two distinct layers are separated, and the aqueous hydriodic acid is boiled for a few minutes in order to expel hydrogen sulphide if present; it is then chemically pure, and can be used for preparing the various iodides.—*Schw. Wochenschr. f. Pharm.*, Feb. 13, 1880, p. 54, from *Jahresber. d. Phys. Ver. z. Frankf.*

Borocitric Acid and its Salts.—Ed. Scheibe proved that citric acid forms with boracic acid a soluble compound, the two constituents always uniting in the proportion of 2 molecules of citric and 1 molecule of boracic acid. The corresponding proportions by weight are: 1 part by weight of boracic acid, and 7 parts of citric acid. Borocitric acid can be prepared either by adding the boracic acid, with constant stirring, to a solution of the citric acid in boiling water, or by adding the citric acid to the boracic acid suspended in boiling water, and continuing to heat until a complete solution is obtained, or by mixing both acids with water, and heating. On evaporating an aqueous solution of borocitric acid to dryness, a solid, amorphous, light gray mass is obtained, which is readily soluble in water and in strong alcohol. When subjected to dialysis it dialyzed unaltered. While evaporating, some of the boracic acid volatilized with the water. By allowing a very concentrated solution of borocitric acid to evaporate very slowly, the acid was obtained as a decidedly crystalline fibrous mass. The crystalline borocitric acid differs from the amorphous only in being less compact and having a snow-white color; in all other respects it closely resembles the amorphous acid into which it is soon transformed, even when kept in closed vessels. Both compounds are not altered by the air, unless the atmosphere is very moist, when they deliquesce. The borocitrates of the alkalies are permanent salts, soluble in water, while the salts of the heavy metals are partially soluble in water and partially insoluble, the boracic acid apparently not being combined very firmly. All salts of borocitric acid color turmeric paper brownish-red, and are decomposed by stronger acids, which separate the boracic acid. *Potassium biborocitrate* is the only salt which has been obtained in crystals so far.—*Phar. Zeits. f. Russland; Schw. Wochenschr.*, Feb. 13, 1880, p. 50–53.

Morphia Muriate.—The extensive investigations of Dr. H. Tausch prove that:

1. The commercial morphia muriate is very rarely chemically pure, but usually contains a varying percentage of resinous substances.

2. When morphia muriate is dried for some time, and the heat is raised to 100°C., it not only loses the hydrochloric acid, adhering to it mechanically, but also its total water of crystallization, and it is therefore necessary to prescribe either the morphia muriate dried in the air, and therefore containing water of crystallization, or the morphia muriate dried at 100°C., which contains no water of crystallization, but about 15 per cent. more alkaloid than the former.

3. Pure morphia muriate when heated at 130° is not altered, while the impure commercial salt exhibits a brown or even black coloration.

4. In all cases in which morphia muriate is to be used, it is important to remember that the 1 molecule of water of crystallization, with which it separates from its solutions, can be removed by heating to 100°.—*Ztschr. d. Allg. Oest. Apoth. Ver.*, Feb. 10, 1880, p. 65–69, and Feb. 20, 1880, p. 82–85.

Morphia Muriate, relation of Bulk and Weight.—The apparent difference in weight and the plainly-visible difference in bulk of different lots of commercial morphia muriate were hitherto considered due to a difference in the percentage of moisture or water contained in the different lots. Hager recently reinvestigated the cause, and found that this depends solely upon the difference in the size of the crystals. *Pharm Centralh.*, Feb., 12, 1880, p. 55.

Monobromated Camphor.—C. C. Keller dissolves 300·0 camphor in 150·0 or 180·0 chloroform, filters the solution into a large tubulated retort, adds 320·0 pure bromine, and sets aside for several hours in a cold place until a crystalline paste of camphor dibromide, $C_{10}H_{16}OBr_2$, is formed; the tubulure of the retort is now closed with a safety tube, and heat is applied by means of a water-bath, when the camphor dibromide is decomposed into monobromated camphor and hydrogen bromide, the latter escaping, a portion of the chloroform and a little bromine distilling over at the same time. After being heated for 2 or 3 hours the dark brown colored contents of the retort turn light yellow. When but minute portions of hydrogen bromide vapors escape, the retort is removed from the water-bath and is allowed to stand in a cold place for about 24 hours, when the monobromated camphor separates in light yellowish crystals, which are freed from the mother-liquor,

washed with a little absolute alcohol, until they appear white, then recrystallized from ether, and, in case the solution was acid, are washed with solution of sodium carbonate, and then recrystallized from alcohol. By evaporating the wash-water and the etherial mother-liquor, another small yield of monobromated camphor is obtained. The total yield obtained by the author from 300·0 camphor amounted to 340·0 grams. The liquid, which distils over, and consists of hydrobromic acid, bromine and chloroform, may be decolorized with sulphuretted hydrogen, and utilized for making potassium bromide or some other bromide.—*Schw. Wochenschr. f. Pharm.*, Feb. 13, 1880, p. 50.

Theobromina, from Cacao Shells, is obtained by Donker, Treumann and Dragendorff, by extracting them with boiling water, filtering, expressing, precipitating with subacetate of lead, removing the lead with sulphuric acid, filtering, concentrating, evaporating with calcined magnesia, and extracting the residue with 80 per cent. alcohol, which extracts the theobromina. This is then purified by recrystallizing from water. By this process 4 to 5 kilograms of shells yielded 13·5 grams of colorless theobromin.—*Pharm. Ztg.*, Feb. 28, 1880 p. 125, from *Jahresber ueber d. Fortschr. d. Chem.*

Gastrolobin, a New Glucoside.—By extracting the leaves and young branches of Gastrolobium bilobum with boiling water, treating the evaporated extract with alcohol in order to remove gummy substances, separating the aqueous solution from a blackish resin, precipitating with neutral lead acetate after adding a little free acetic acid, decomposing the lead precipitate by dilute nitric acid, filtering, evaporating the filtrate, redissolving the extract, again precipitating with lead subacetate, washing the precipitate, decomposing under water with sulphuretted hydrogen, and evaporating the liquid to dryness, F. v. Mueller and L. Rummel obtained "gastrolobin," as a blackish, brittle, hygroscopic substance, having an odor and taste resembling sassafras, soluble in hot water and alcohol, precipitated from the aqueous solution by lead subacetate, readily decomposed by boiling with mineral acids, and partially with organic acids, and dissolving in liquor ammoniæ, forming an intensely yellow solution. The authors obtained a yield of 1 per cent. glucoside from the dried herb, but consider it possible that the blackish resin mentioned above is a decomposition product of gastrolobin; whether the latter is the poisonous principle of the herb must be determined by future investigations. A similar poisonous principle has been found in other species of Gastrolobium, in Oxylo-

bium, in Isotropis striata, *Bth.*, etc.—*Ztschr. d. Allg. Oest. Ap. Ver.*, Feb. 20, 1880, p. 81.

An Adulteration of Powdered Cloves, with a large percentage of stems, a little starch, and a fatty oil, the latter of which had been added by the wholesale dealer in order to impart a darker color to the powder, is reported by E. Heintz, who further states, that the odor and taste of the cloves were as usual, that the stems and starch were detected by means of a microscope, and that, when the cloves were treated with carbon bisulphide, 19 per cent. of a substance was extracted which on evaporation was found to consist principally of fatty oil.—*Pharm. Handelsbl.*, Feb. 11, 1880, p. 6.

False Quebracho Bark (see also "Am. Journ. Pharm.," April, 1880, p. 202).—This bark is found in the German market in large quantities, and is described by Dr. J. Biel, as follows: It consists of pieces of different length, ½ to 2 inches in width, 2 to 5 millimeters in thickness, usually rolled, and covered externally with the yellowish-white periderm which exhibits numerous deep longitudinal furrows and faint transverse fissures; internally the bark is dark brown. The fracture appears in the outer bark granular, and in the inner bark long-fibrous; the taste is bitter, but not aromatic. The outer bark consists of numerous regular layers of tabular leathery cork cells, covering an equally thick spongy cork layer, composed of tangentially stretched wide and thin-walled cells. A light, continuous circle of stone cells, with strongly thickened walls, forms the inner limit of this layer, and can be seen with the naked eye. The middle bark consists of parenchyma cells, filled partially with a dark brown substance, and besides contains scattered groups of 10 to 20 stone cells and scattered bast-cell bundles, which are more numerous towards the inner layer, and finally form the inner bark, consisting almost entirely of these bast-cells, and of narrow, radially placed medullary rays, containing a dark substance.—*Pharm. Ztg.*, Feb. 25, 1880, p. 118.

CHEMICAL NOTES.

By Prof. Samuel P. Sadtler.

Inorganic Chemistry.—*On the Artificial Formation of the Diamond.*—J. B. Hannay, in the course of an elaborate investigation made jointly with J. Hogarth, on the solubility of solids in gases, has succeeded in obtaining carbon crystallized in the form of the diamond. He noticed

first that many bodies, such as silica, alumina and oxide of zinc, which are insoluble in water at ordinary temperatures, dissolve to a very considerable extent when treated with water-gas at a very high pressure. It occurred to him that a solvent might be found for carbon, and as gaseous solution nearly always yields crystalline solid on withdrawing the solvent or lowering its solvent power, it seemed probable that the carbon might be deposited in the crystalline state. Ordinary carbon, such as charcoal, lampblack or graphite was found not to be acted upon. It was found, however, that carbon could be gotten in the nascent state by the following reaction. When a gas containing carbon and hydrogen is heated under pressure in presence of certain metals, its hydrogen is attracted by the metal and its carbon left free. When the carbon is set free in presence of a stable compound containing nitrogen, the whole being near a red heat and under a very high pressure, the carbon is so acted upon by the nitrogen compound that it is obtained in the clear transparent form of the diamond. The carbon so obtained is as hard as natural diamond, scratching all other crystals, and it does not affect polarized light. The crystals have curved faces belonging to the octahedral form; they burn easily on thin platinum foil, leaving no residue, and after two days' immersion in hydrofluoric acid they show no sign of dissolving even when boiled.—*Chem. News*, March 5th, 1880.

Dissociation of Chlorine, Bromine and Iodine.—The first results of Victor Meyer on this subject have already been noted (this JOURNAL, Sept., 1879). J. M. Crafts has repeated these experiments, working with slightly modified apparatus. Using free chlorine, instead of the nascent chlorine evolved from platinum chloride, he found no change in the vapor density of the gas even at the highest temperature of the furnace. With iodine, however, he did find the change in vapor-density referred to by Victor Meyer, viz, a reduction to two-thirds the normal value. With bromine he got results giving a value intermediate between the normal and the two-thirds value.

Victor Meyer and Lüblin now publish results obtained by them prior to the publication of Craft's paper bearing upon the same subject. They found also that free chlorine gave a normal density under all changes of temperature, so that it is only when nascent chlorine is tried that the abnormal density or dissociation, as they view it, is gotten. Iodine, however, taken in the free state, showed dissociation at all temperatures over about 1,000°C. With bromine, if the free element

was taken, great difficulty was experienced in getting satisfactory determinations, owing to its volatility. The results agreed in general with those of Craft's. When the bromine was liberated in the nascent state from platinic bromide, $PbBr_4$, they got results agreeing exactly with $\frac{2}{3}$ Br_2, showing dissociation. They say nothing as yet of the nature of the dissociation products of the three halogens.—*Nature*, March 18th, 1880, p. 461.

Manufacture of Glauber's Salt in the south of France.—The following interesting description of the extraction of Glauber's salt from the sea-brines, as now practiced at the large salines at the mouth of the Rhone River, contains several items of interest to the chemist.

The sodium sulphate is obtained by decomposing a liquor which contains common salt and magnesium sulphate in proper proportions by the aid of artificial cold. The Carré ice machine is used for this purpose. The crude material, the *sel mixte*, crystallizes out at a certain stage in the evaporation of the mother-liquor left after common salt has crystallized. This special liquor is then cooled by an ingenious application of the refrigerating process until —6°C. is reached, when Glauber's salt separates out as a crystalline scum, which is removed and carried by elevators to large draining casks. Here the salt is freed from adhering water and is now ready to be made anhydrous. This operation had given great difficulty, as the evaporation in iron pans was not possible, on account of the tendency of the separating anhydrous sulphate to burn, and calcination with the aid of a reverberatory flame was also extremely difficult to carry out. The difficulty has been overcome very simply. The water of crystallization is not driven off by heat, but is displaced. For this purpose the crystallized Glauber's salt, in quantities of 1,500 kilograms, is fused with a small amount of the mother-liquor in a wooden tank heated by a copper worm and provided with stirrers, when 250 kilos of common salt are added. In the degree that the salt dissolves, anhydrous Glauber's salt is precipitated, and at the end of the operation about 85 per cent. of the Glauber's salt originally used is gotten as an anhydrous precipitate. The salt so obtained has at most 0·5 per cent. sodium chloride and 5 per cent. of water present.—*Chem. Industrie*, Jan. 1880, p. 9.

Organic Chemistry.—*Extraction of Fresh Flower Perfumes with Methyl Chloride.*—C. Vincent, who has prepared methyl chloride recently in such large amount from the residues of beet-root molasses (this JOURNAL, March, 1879, p. 126) has made experiments on a large

scale as to its use as a means of extracting the perfume of flowers. Using this solvent, which evaporates at very low temperature, for extraction in closed vessels, the perfumes are obtained perfectly unaltered and in fresh condition, mixed with fat and wax-like substances. This mixture gives up to alcohol the perfume perfectly pure. The methyl chloride, to be used for this purpose, must be previously treated with concentrated sulphuric acid, to free it from traces of a bad-smelling compound which may sometimes accompany it.—*Ibid.*, Feb., 1880, p. 59.

On the Reaction of Ferric Chloride with Salicylic, Carbolic, Gallic and Tannic Acids.—H. Hager gives the following means of distinguishing between these acids by the aid of the ferric chloride test. The substances which interfere with the violet coloration which ferric chloride gives with these acids are numerous, and by noting them we may obtain a clue as to which of the acids may be present in a solution. Thus with *salicylic acid* the reaction is not disturbed or hindered by the presence of acetic, boracic, sulphuric, nitric or hydrochloric acids (all acids in dilute condition), common salt, nitre, glycerin, alcohol, amyl alcohol or ether. It is hindered by caustic alkalies, alkaline carbonates, sodium acetate, ammonium acetate, borax, potassium iodide, sodium phosphate, oxalic, citric, tartaric, phosphoric and arsenic acids. With *carbolic acid* the reaction is not hindered by boracic acid, common salt or potassium nitrate. It is hindered by acetic, oxalic, tartaric, citric, sulphuric, hydrochloric, nitric and phosphoric acids, sodium acetate, ammonium acetate, borax, sodium phosphate, glycerin, alcohol, amyl alcohol and ether.

Phosphoric acid decolorizes both with salicylic and carbolic acids and with gallotannic and gallic acids as well. The officinal sodium phosphate, however, hinders the reaction with salicylic and carbolic acids, but not with tannic and gallic acids.

For a preliminary distinction between salicylic and carbolic acids the solution is to be treated in abundance with alcohol or glycerin, or with dilute acetic acid, and then tested with ferric chloride. Salicylic acid will give the reaction, carbolic acid will not.

To distinguish whether gallotannic or gallic acid be present, add sodium phosphate to the solution, and then test with ferric chloride. The violet coloration will show their presence, but is not produced by salicylic or carbolic acids.—*Dingler's Polytechn. Jour.*, 235, p. 407.

Note on the Action of the New Diastase, Eurotin, on Starch.—R. W.

Atkinson, Professor of Chemistry at Tokio, Japan, describes the action of the ferment which the Japanese use instead of malt in brewing processes. The fermenting body is called Koji, and is prepared as follows: Washed rice is soaked in water until soft; it is then steamed for some hours, until the starch has gelatinized. When lukewarm, the mass is sprinkled with spores of the fungus *Eurotium oryzea*. The grains are then well mixed and exposed in trays to a temperature of about 25°C. In three days the mass is cemented together by the silky filaments of the mycelium and forms the "koji" which is used instead of malt in the brewing process. When extracted with water, koji yields a solution reducing the Fehling test. When digested with water for about ten minutes the solution gives about 12 to 14 per cent. of glucose. Korschett has shown ("Dingler's Polytech. Jour.," 230, p. 76) that the cold aqueous extract of koji has properties resembling those of malt, and when added to gelatinized starch renders it limpid and forms sugar. He also concluded that the temperature of 40° to 50°C. was the most favorable to this change. The author of the present paper comes to the conclusion that the starch breaks up in this process into glucose and dextrin instead of maltose and dextrin, as in our mashing operations.

A mixture of koji, steamed rice and water is made in the cold. On the 5th to the 7th days the mash is warmed by introducing tubes filled with hot water. Further additions of steamed rice and water were made between the 14th and 17th days, and again on the 18th day, a fourth addition of steamed rice, ferment and water took place. The mash was then pressed, and during the interval the small quantity of dextrin underwent fermentation, and the specific rotatory power of the filtered liquid became almost *nil*. The filtered liquid (Saké), which contains the water used to rinse out the fermenting tubes, contains 11·14 per cent. alcohol; glycerin and resin, 1·99; fixed acid, 0·13; volatile acid, 0·02; water, 86·72. The fermentation is probably spontaneous. The size of the ferment cells is a little less than that of beer yeast.—*Chem. News*, April 9, 1880, p. 169.

THE DIFFUSIVE PROPERTIES OF SOME PREPARATIONS OF IRON.

By Proeessor Redwood.

Attention has recently been directed to the properties possessed by

[1] Read at an evening meeting of the Pharmaceutical Society of Great Britain, March 3, 1880.

oxide of iron as it exists in dialyzed iron, and founded on the observation of these properties it has been inferred that dialyzed iron is a very inert preparation. The iron exists here in what Graham has designated the colloidal state, in which it has a very low diffusive power. It was observed by Graham that substances which in solution possessed very low diffusive power were characterized by the absence of the crystallizing property and that they generally formed gelatinous hydrates, while substances of high diffusive power generally belonged to the class of crystalline bodies. Hence the names *colloid* and *crystalloid* applied to these two classes of substances.

But although substances of very low diffusive power are always found to be uncrystallizable, it cannot be inferred that the absence of crystalline property will be necessarily attended with low diffusive power. I proved this experimentally many years ago, and briefly stated the fact in a communication made to this Society on Dialysis in 1862. Yet the opinion appears to be often entertained that the diffusive property of substances in solution bears some relation to the power they possess of assuming a crystalline condition; and as we have now several preparations of iron, largely used and considered to be efficacious medicines, which are entirely devoid of the power of crystallizing, it may be of use to show the position which these and some other preparations occupy with regard to their diffusive properties.

If, as stated by M. Personne in his recent communication to the French Academy of Medicine, a notice of which appeared in the "Pharmaceutical Journal" of last November, dialyzed iron is incapable of being absorbed during its passage through the intestinal canal, and is therefore inactive, and if this is due to the colloidal state of the iron, it might be expected that other preparations of iron would, at any rate to some extent, owe their activity as medicinal agents to their diffusive properties.

Now, among the preparations of iron which have become most largely used in medicine are the scaled preparations, which, in common with dialyzed iron, are often preferred to the crystalline salts of iron on account of the absence of the inky taste which characterizes the latter. The absence of inky taste and strong styptic property may tend to induce a belief that the scaled preparations of iron are either colloidal, like dialyzed iron, or at least that they are deficient in diffusive power, for colloids are usually marked by absence or deficiency of taste.

The experiments, the results of which I am about to lay before the Society, were made for the purpose of showing what the relative diffusive power of some of the salts of iron is, and to what extent this is connected, in such salts, with their crystalline or amorphous condition.

The dyalizer used in the experiments consisted of a glass jar, the membrane-covered mouth of which was 5½ inches in diameter; and this rested in the mouth of a wide earthen dish. Two thousand grain-measures of either a 5 per cent. or a 10 per cent. solution of the salt used was put into the glass jar, and 25 ounces of water into the dish. The diffusate was usually removed at the expiration of two, but sometimes of three days, at the commencement of an experiment, although a longer time was allowed for each separate diffusion when the action became sluggish towards the end of an experiment.

1. *Citrate of Iron, Ferric Citrate.*—Some simple citrate of iron was made in the usual way, by dissolving to saturation moist, recently precipitated hydrated peroxide of iron in solution of citric acid. After being scaled and dried at 212°, it was found to contain 32·29 per cent. of ferric oxide, Fe_2O_3. Aided by heat, it was perfectly soluble in water, the solution being acid to test paper. 200 grains of this salt dissolved in water to make 2,000 grains (10 per cent. solution) was put into the dialyzer. At the expiration of two days the diffusate was removed, evaporated to dryness, and the residue dried at 212°F. It amounted to 51·26 grains, or 25·63 per cent. of the salt, and on being incinerated it gave 22·45 grains, or 43·75 per cent. of oxide of iron. It thus appeared that the iron was diffusing more rapidly than the acid with which it had been combined. Fresh water having been introduced into the dish, the diffusion subsequently went on more slowly, but the results still showed that the iron was diffusing more rapidly than the acid. At the end of fifteen days, 125·59 grains of the salt had passed through the membrane.

The results of the experiment are given in the following tabulated statement:

200 *grains of Citrate, containing* 64·58 *grains of* Fe_2O_3 *in Dialyzer.*

Days.	Amount of salt diffused.	Amount of Fe_2O_3 in diffusate.	Per cent. of salt diffused.	Per cent of Fe_2O_3 in diffusate.
2	51·26	22·45	25·63	43·75
4	44·81	19·45	22·41	45·63
4	20·50	8·67	10·25	42·26
5	9·02	4·10	4·51	45·45
14	6·37	3·68	3·18	57·77
29	131·96	58·35	65·98	

	Residue in Dialyzer.			Per cent. Fe_2O_3 in residue.
	4·86	2·75	——	56·65
Total, .	136·82	61·10		
Loss, .	63·18	3·48		
	200·00	64·58		

It will be seen that of the 200 grains of the salt, containing 64·58 grains of Fe_2O_3, put into the dialyzer, 131·96 grains of salt, containing 58·35 grains of Fe_2O_3, had diffused in twenty-nine days, and that there was then a residue in the dialyzer amounting to 4·86 grains of salt, containing 2·75 grains of Fe_2O_3. There was thus an apparent loss in the process of 63·18 grains of salt, but of only 3·48 grains of Fe_2O_3, the latter no doubt partly arising from adhesion to the septum. No entire cessation of diffusion was observed.

The citrate of iron used in the experiment was, as it always is, acid to test paper, and the first two diffusates were so also, but the third and subsequent diffusates were neutral, indicating the disappearance of some of the acid radical.

2. *Ammonio-citrate of Iron.*—This salt, as met with in commerce, usually contains about 30 per cent. of peroxide of iron, Fe_2O_3, but the proportion varies in different samples. Several samples were submitted to dialysis.

(2, *a.*)—A 10 per cent. solution of ammonio-citrate, containing 30·21 per cent. of Fe_2O_3, was dialyzed, and the results examined as in the previous experiment. At the expiration of two days, 124·59 grains or 62·29 per cent. of the salt had diffused, and this contained 27·22 per cent. of the Fe_2O_3. At the end of another four days, 25·79 grains more of the salt, with 32·90 per cent. of Fe_2O_3, had diffused, making the total diffusate in six days 150·38 grains, or 75·19 per cent. of the salt put into the dialyzer, and 70 per cent. of the iron contained in the salt. The diffusion afterwards went on very slowly, yielding only 3·79 grains in ten days, and at the end of twenty-two days from the commencement, when the diffusion had nearly stopped, the dialyzer contained 20·26 grains of a salt in solution, in which the Fe_2O_3 amounted to 61·61 per cent.

(2, *b.*)—A 10 per cent. solution of a salt containing 30·9 per cent. of Fe_2O_3 was dialyzed for two days. The diffusate gave 108·94 grains, or 54·47 per cent. of dried salt, containing 27·9 per cent. of Fe_2O_3. In four days more another diffusate was obtained, giving 37·36 grains,

or 18·68 per cent. of the salt, and containing 34·44 per cent. of Fe_2O_3. In this case 73·15 per cent. of the salt and 70 per cent. of the iron contained in the salt had diffused in six days. The diffusion then, as in the previous experiment, went on very slowly, and at the end of sixteen days it had nearly stopped, although the dialyzer still contained 19·55 grains of a salt with 52·48 per cent of Fe_2O_3 in it.

(2, *c.*)—A 10 per cent. solution of a salt containing 30·65 per cent. of Fe_2O_3 was put into the dialyzer. In two days the diffusate gave 96·11 grains, or 48·05 per cent. of the salt, and this contained 31·42 per cent. of Fe_2O_3. In four days more another diffusate was obtained, which yielded 27·60 grains, or 13·8 per cent. of the salt, and contained 37·46 per cent. of Fe_2O_3. In this case 61·85 per cent. of the salt, and 66·15 per cent. of the iron contained in the salt, had diffused in six days. The diffusion had now entirely stopped, although there still remained 32·45 grains of a salt containing 22·55 grains of ferric oxide in the dialyzer.

In the three preceding experiments the solutions used and the diffusates obtained were neutral to test paper. The citrates employed were apparently good commercial samples, well scaled and perfectly soluble, but they evidently differed in constitution, as indicated by difference in the results of their diffusion, for they were all treated similarly and subjected to the same conditions. It will especially be observed that diffusion in the case of (2, *c.*) ceased entirely at the end of six days, although the dialyzer still contained 32·45 grains of a salt in which there were 22·55 grains of ferric oxide, but this, being in the form of a highly basic salt, was no longer diffusible.

With the view of trying the effect of altered conditions on the salt used in the last experiment, a solution made alkaline with ammonia was used as follows:

(2, *d.*)—A 10 per cent. solution of the citrate used in experiment (2, *c.*) was made strongly alkaline with ammonia. In two days the diffusate gave 92·65 grains, or 46·32 per cent. of a salt containing 32·59 per cent. of Fe_2O_3. Another diffusate was obtained in four days more which yielded 17·55 grains, or 8·77 per cent. of salt containing 51·22 per cent. of Fe_2O_3. In this case 55·09 per cent. of the salt, and 63·93 per cent. of the iron had diffused in six days. And now, at the end of six days, diffusion had stopped, as in the previous experiment, while the dialyzer still contained an undiffusible salt containing 68·38 per cent. of Fe_2O_3.

The following table will show the principal results of dialysis in the preceding four experiments:

Ten per cent. Solutions (200 *grains of Ammonio-Citrate of Iron in* 2,000 *grains of Solution*) *Dialyzed for Six Days.*

	Amount of salt diffused.	Per cent. of salt diffused.	Per cent of Fe_2O_3 in diffusate.	Diffusion on sixth d.y.	Per cent. of Fe_2O_3 in salt not diffused.
(2, *a*)	150·38	75·19	28·2	not ended	61·61
(2, *b*)	146·30	73·15	29·5	not ended	52·48
(2, *c*)	123·71	61·85	32·7	ended	69·49
(2, *d*)	110·20	55·10	35·5	ended	68·38

Having observed that diffusion stopped when the salt in the dialyzer became highly basic, and that the diffusate as well as the contents of the dialyzer became more and more basic as the process proceeded, results which I shall have to refer to hereafter, I thought that probably by starting with a salt containing less than the usual proportion of oxide of iron the diffusion might be carried further than it had been found possible to carry it in the preceding experiments.

I obtained a good, well-scaled, neutral and perfectly soluble sample of ammonio-citrate of iron, containing only 25·92 per cent. of Fe_2O_3. 10 per cent. and 5 per cent. solutions of this salt were submitted to dialysis, in the way already described, and the results obtained are given in the following tabulated statements:

(2, *e.*)—10 *per cent. Solution.*

Days.	Amount of salt diffused.	Per cent. of salt diffused.	Per cent of Fe_2O_3 in dried diffusate.
2	92·23 grs.	46·10	21·56
2	30·62	15·31	32·23
3	23·37	11·68	33·13
3	8·16	4·08	35·50
3	2·27	1·13	37·40
4	·55	·27	39·43

At the end of twenty-eight days, diffusion having stopped, the salt still left in the dialyzer was found to contain 61·26 per cent. of Fe_2O_3.

(2, *e.*)—5 *per cent. Solution.*

Days.	Amount of salt diffused.	Per cent. of salt diffused.	Per cent. of Fe_2O_3 in dried diffusate.
2	66·65 grs.	33·32	25·07
2	25·73	12·86	30·12
3	17·91	8·95	32·44
3	6·4	3·2	35·88
3	2·47	1·23	36·01
4	1·64	·82	38·94
6	1·14	·57	40·01

At the end of twenty-eight days, diffusion having stopped, the salt in the dialyzer was found to contain 68·54 per cent. of Fe_2O_3.

3. *Potassio-Tartrate of Iron, Tartarated Iron.*—This salt, which, until the adoption of the process now given in our Pharmacopœia, was commonly supplied in the form of an imperfectly soluble powder, is now produced in soluble transparent scales. But, as it is more susceptible of change from slight variation of the conditions to which it is subjected, it is less uniform in composition and properties than the salt previously referred to—the ammonio-citrate. Several samples of potassio tartrate of iron were submitted to dialysis.

(3, *a.*)—A 10 per cent. solution of potassio-tartrate containing 31·09 per cent. of Fe_2O_3 was put into the dialyzer. In two days 94·02 grains or 47·01 per cent. of the salt had diffused, containing 22·67 per cent. of Fe_2O_3. In four days more a further quantity of 25·99 grains, or 12·99 per cent. of the whole was obtained, containing 32·97 per cent. of Fe_2O_3. Only slight diffusion took place beyond this. The residue left in the dialyzer at the end of ten days contained 65·36 per cent. of Fe_2O_3.

(3, *b.*)—A 10 per cent. solution of potassio-tartrate, containing 36.25 per cent. of Fe_2O_3, submitted to dialysis, gave in two days a diffusate from which 53·01 grains, or 26·5 per cent. of a salt containing 8·82 per cent. of Fe_2O_3 was obtained. In four days more another product of 22·32 grains, or 11·16 per cent. of the whole, and containing 7·03 per cent. of Fe_2O_3 was obtained. The residue left in the dialyzer contained 62·70 per cent. of Fe_2O_3.

(3, *c.*)—A 10 per cent. solution, the same as the last, but rendered alkaline with potash, after being dialyzed for two days gave a diffusate containing 79·83 grains, or 39·91 per cent. of dry salt, with 12·31 per cent. of Fe_2O_3. In another four days 33·7 grains or 16·85 per cent. of the salt had diffused, containing 10·71 per cent. of Fe_2O_3. The residue in the dialyzer contained 60·30 per cent. of Fe_2O_3.

The following table gives the principal results of the preceding three experiments:

Ten per cent. Solutions (200 *grains Potassio-Tartrate of Iron in* 2,000 *grains of Solution*) *Dialyzed for Six Days.*

	Amount of salt diffused.	Per cent. of salt diffused.	Per cent. of Fe_2O_3 in diffusate.	Diffusion on the sixth day.	Per cent. of Fe_2O_3 in salt not diffused.
(3, *a*)	120·0	60·0	24·9	not ended	65·36
(3, *b*)	75·33	37·66	8·2	not ended	62·70
(3, *c*)	113·53	56·76	11·8	not ended	60·30

It thus appears that the potassio-tartrate of iron is a less diffusable salt than the ammonio-citrate, and this especially applies to the iron as

a constituent of the salts. It also appears, on comparing the results of experiments (3, *a*) and (3, *b*), that the salt containing the larger proportion of oxide of iron diffuses more slowly than the other, and that the diffusate contains a smaller proportion of iron.

4. *Citrate of Iron and Quinia.*—This preparation, for which, in its most approved form, an available process was first published in the present edition of the British Pharmacopœia, although a somewhat indefinite, or at least an undefined, compound, is an important and valuable medicine, and it seemed desirable, in connection with the present object of this inquiry, to determine the extent to which it is capable of undergoing diffusion through a membrane.

A 10 per cent. solution, containing 200 grains of a good sample of citrate of iron and quinia, gave a diffusate in two days yielding 76·8 grains of dry residue, containing 21·65 per cent. of ferric oxide. In two days more it gave a further diffusate, yielding 21·18 grains of dry residue containing 28·8 per cent. of ferric oxide; and again, in two days more it gave 16·6 grains of a residue with 27·7 per cent. of oxide, making the salt diffused in six days equal to 57·29 per cent. of that put into the dialyzer. The proportion of quinia in relation to the iron was not determined in this case, and in this and other respects further experiments have yet to be made; but it is evident from the results obtained that citrate of iron and quinia is a freely diffusible preparation.

5. *Sulphate of Iron, Ferrous Sulphate,* $FeSO_4.7H_2O$.—A 10 per cent. solution (200 grains in 2,000 grains of solution) slightly acidulated with sulphuric acid and dialyzed for two days gave a diffusate yielding 36·4 grains of ferric oxide, and dialyzed for four days more it gave a further diffusate yielding 14·7 grains of ferric oxide, thus making the amount of iron, reckoned as ferric oxide, diffused in six days, 51·1 grains, corresponding to 35·7 grains of iron, and as the salt put into the dialyzer contained 40·2 grains of iron, it follows that 89·2 per cent. of the iron had diffused in six days.

The experiment was carried on for two days longer, in which time a further diffusate yielding 3·76 grains of ferric oxide was obtained, making the total amount of iron diffused in eight days equal to 96 per cent. of the whole.

6. *Persulphate of Iron, Ferric Sulphate.*—A solution was made by dissolving 200 grains of ferrous sulphate, converting it into the ferric salt, and making it up to 2,000 grains. The solution, therefore, contained

the same amount of iron as that used in the preceding experiment, namely, 40·2 grains Fe. Dialyzed for two days it gave a diffusate yielding 34·9 grains of ferric oxide, and in four days more it gave a further diffusate, yielding 14·2 grains of ferric oxide, thus making the amount of iron as ferric oxide 49·1 grains, corresponding to 34·12 grains of iron, diffused in six days, or 85·3 per cent. of the iron put into the dialyzer.

The experiment was carried on for two days longer, when a further diffusate was obtained, yielding 4·1 grains of ferric oxide, making the total amount of iron diffused in eight days equal to 93 per cent. of the whole.

7. *Chloride of Iron, Ferrous Chloride*, $FeCl_2.4H_2O$.—A 10 per cent. solution, 100 grains in 1,000 grains of solution, dialyzed for two days gave a diffusate, yielding 33·96 grains of ferric oxide, and dialyzed for four days more it gave a further diffusate, yielding 4·3 grains of oxide, making 38·26 grains of ferric oxide, corresponding to 26·8 grains of iron, or 95·7 per cent. of the iron contained in the dialyzer, diffused in six days.

8. *Perchloride of Iron, Ferric Chloride.*—100 grains of ferrous chloride converted into a ferric salt, and diluted to 1,000 grains, gave results nearly coinciding with those of the ferrous chloride.

On comparing the results of the foregoing experiments, it will be seen that, while the sulphates and chlorides, and especially the latter, stand pre-eminent in regard to the extent and rapidity with which they undergo liquid diffusion through a membrane, it cannot be said, in a medical sense, that the scaled preparations, and especially those made with citric acid, are deficient in diffusibility, for the latter being given in much larger doses than the former would be absorbed into the system to fully an equal extent.

9. *Dialyzed Iron.*—Although most of the experiments hitherto described in this paper were made simply for the purpose of showing the relative diffusibility of preparations of iron which are used in medicine, without reference to dialyzed iron, and of ascertaining how far the diffusive property of such preparations is affected by their crystalline or amorphous condition, yet as the immediate object of publishing the results at this time was to show that the scaled preparations of iron of the Pharmacopœia are not subject to the objections which have been recently urged against dialyzed iron, I have been led to make some experiments with the view of ascertaining how far the properties ascribed

to dialyzed iron are really possessed by it, and are likely to affect its medicinal efficacy.

Dialyzed iron has been largely introduced to the notice of the medical profession, and strongly recommended as an efficacious chalybeate, which is free from objections that attach to other chalybeate medicines. It would appear to have some strong recommendations if it could be clearly shown that it is capable of being absorbed during its passage through the intestinal canal. But while it is freely admitted that it has the advantage of being nearly tasteless, free from astringency, and not liable to cause constipation or gastric disturbance, it has at the same time been broadly asserted that it is perfectly inert on account of its colloidal nature—that the oxide of iron is precipitated in the stomach in a state in which it is insoluble in the acids of the stomach and incapable of undergoing liquid diffusion.

The following experiments were made with a sample of dialyzed iron containing 5·28 per cent. of ferric oxide and ·23 per cent. of chlorine. The iron was completely precipitated by adding to the dialyzed iron twenty times its volume of water of the London water supply.

(9, *a.*)—The oxide of iron obtained from 100 grains of the dialyzed iron by addition of 2,000 grains of New River water was collected on a filter, washed with distilled water and digested with water to which hydrochloric acid of known strength was gradually added until the oxide of iron became apparently dissolved, a clear and permanent, although not brilliant, reddish-brown liquid resulting. It was found that 1·44 grains of hydrochloric acid (HCl) was thus required for the 5·28 grains of oxide of iron. This solution was put into a dialyzer, but at the end of two days not a trace of iron had passed through the septum.

(9, *b.*)—Another similar quantity of precipitated oxide was digested with double the quantity of hydrochloric acid, namely 2·88 grains of HCl, but the result at the end of two days was the same. None of the iron had diffused.

9, *c.*)—Another similar quantity of oxide, namely, 5·28 grains, was digested with 7·5 grains of hydrochloric acid (HCl), this being the quantity required for converting the ferric oxide into ferric chloride, in the event of such conversion occurring. In this case it was found that after the liquid had been in the dialyzer for two days a very small quantity, ·1 grain, of the iron had diffused.

In the last three experiments the oxide had been digested at a tem-

perature of 100°F., for about an hour, before putting the liquid into the dialyzer.

(9, *d.*)—In this experiment the oxide of iron and hydrochloric acid, in the proportion for forming ferric chloride, were boiled together for several minutes, and the liquid after cooling was put into the dialyzer. At the end of two days a trace of iron had passed through the septum, but not more than in the preceding experiment.

The hydrochloric acid in these experiments was greatly in excess of that usually present in the free state in the stomach, which, according to Lehmann, is about ·125 per cent.

A suggestion having been made that the colloidal iron of dialyzed iron, although not diffusible when brought into a state of apparent solution with hydrochloric acid, even when this is much in excess of what is required for such solution, might be taken up by the albuminoids in the stomach and thus rendered assimilable, experiments were made in that direction.

(9, *e.*)—A dilute solution of albumen with hydrochloric acid was digested for two hours with dialyzed iron at 100°F., and then left in a dialyzer for two days, but no iron was found in the diffusate.

(9, *f.*)—A peptone was prepared by dissolving 50 grains of coagulated albumen with 2 grains of pepsin in 500 grains of 1 per cent. dilute hydrochloric acid, adding 50 grains of dialyzed iron, and digesting them together for two hours at 100°F. This was put into a dialyzer for two days, but here again not a trace of iron was found in the diffusate.

In view of these results it can hardly be conceived that dialyzed iron should be an active or efficacious medicine. At any rate it remains for those who advocate its use to suggest a theory by which medicinal activity may be reasonably ascribed to a substance having the properties which this preparation has been proved to possess.—*Pharm. Jour. and Trans.* [London], March 6, 1880.

VARIETIES.

Bromhydrate of Morphia.—This is more soluble in water and is twice as powerful as the sulphate. It combines the sedative effects of the bromine with the anodyne properties of the morphia. It is not so dangerous, and it is not so apt to be followed by unpleasant symptoms. It is the drug especially for irritative affections of the spinal cord.—*Journal de Therapeutique*, from *Western Lancet*, Jan., 1880.

Sodium Salicylate in Phthisis. By A. Hutchins, M.D.—I desire to call attention to certain useful results to be obtained from sodium salicylate in the advanced stage of phthisis. I am indebted to Dr. B. A. Segur for the original suggestion. The cases in which its effects have been observed are too few, and the effects not snfficiently constant to justify any positive statements as to the precise indications for its use; yet, so far as have been observed, the effects are pronounced enough to justify further observation. My studies, thus far, have been limited to cases in the Brooklyn City Hospital, while Dr. Segur, in addition to some experience in St. Peter's Hospital, has had some cases in private practice, where its effects have been observed.

Allowing this paucity of experience to stand for marginal notes for future observers, it may be stated that the sodium salicylate acts promptly and pleasantly in modifying the colliquative diarrhœa of phthisis. Its action is accompanied by no such contingent or secondary effects as belong to the use of opiates. Of course, no *cure* of the diarrhœa is expected, and a recurrence of the symptom can be met by resuming the medicine. In connection with this, it has been noticed that the administration of the sodium salicylate has been followed by a marked amelioration of the cough, a subsidence of the hectic, and a diminution, sometimes suppression of the night-sweating. It is not known how far these effects can be prolonged by the continued use of the drug, nor to what extent it may be beneficial to intermit it with other remedies. The most that can be said with positiveness is, that without disturbance to the digestion, it, at times, serves an excellent purpose in modifying, to the great relief of the patient, some of the more prominent and distressing symptoms that belong to the latest stage of phthisis. This fact is the only justification for intruding the results of such a limited observation. Ten grains of the drug, repeated every three or four hours, have been found adequate. Dissolved in water, it will not be found offensive if taken in iced-water.—*Proceedings of the Med. Soc. of the county of Kings, New York*, Feb., 1880.

A New Anthelmintic.—The *Ocymum basilicum*, a plant known in Buenos Ayres under the name "albochaca," has an action of such a nature that the worms in every stage of development rapidly leave their location after the juice reaches them. Its use is so much the more to be recommended since, in the event no worms are present no injurious effect results from the plant, but a laxative and disinfectant action is the only result. Fifty grams of the juice is given, followed in two hours by a dose of castor oil. A free discharge of the worms may be expected.

The above observations of Dr. Lemos and the results obtained are very encouraging, and invite further investigation, the more since the number of anthelmintics is limited, and their action often unsatisfactory.—*Med. Neuigk.*, No. 34, 1879, from *Gaillard's Med. Journ.*, March, 1880.

Salicylate of Sodium in Gout.—M. Bouloumié has communicated to the Medical Society of Paris the results of his investigations upon the action of salicylate of sodium during an attack of gout. The author has administered the salicylate to some of his own patients, and he has inquired of a large number who came to Vittel for treatment, whether or not they had been subjected to this method. His own

patients had only been slightly benefitted by the drug, and of thirty-nine patients, whose cases he directed at the mineral springs, only six had taken salicylate of sodium, though they did not appear to be much relieved thereby. Whilst he recognizes, therefore, that salicylate of sodium acts by assuaging the pain, M. Bouloumié would restrict its administration in chronic gout. He points out the inconveniences and even the dangers which may arise from its use, especially if the heart or kidneys be affected, whilst the results are but slight except in very favorable or in subacute cases. He believes that the drug is an active remedy, which should be kept in the therapeutic arsenal to combat gout, though its action in this disease is not so marked as in rheumatism.—*Le Progrès Médical*, from *Cincinnati Lancet and Clinic*, March 13, 1880.

Sclerotic Acid.—This acid is probably the active principle of ergot, having a feeble acid affinity, uniting with sodium to form a stable sclerotate. The acid and its sodium salt have the therapeutic effects of ergot, but the salt in a less marked degree. Both chiefly act on the central nervous system. In mammals the heart is not influenced by even relatively large doses. At death the respiration ceases before the heart. In mammals the acid accelerates intestinal peristalsis; and it excites contraction both of the pregnant and non-pregnant uterus, pre-existing contractions being intensified so that the organ assumes a paler tint. Nikitin, who has been recently studying its effects, says that he calculates that a man weighing about 110 pounds would be killed by about 150 grains of sclerotic acid. The ordinary hypodermic dose is 0·02 to 0·03 gram (one-third to one-half grain) three times a day. Sclerotic acid seems likely before long to partially replace ergot as a drug. It has the advantage of remaining indefinitely without loss of strength, if only kept in a dry place and undissolved. Its sodium salt is considered the best form for internal use in the human subject. Hypodermic injection causes a temporary sharp pain. Von Ziemssen claims for sclerotic acid over ergot in that the former causes no inflammation at the seat of puncture.—*N. C. Med. Jour.*—*Gaillard's Med. Jour.*, April, 1880.

MINUTES OF THE COLLEGE.

PHILADELPHIA, March 29th, 1880.

The annual meeting of the Philadelphia College of Pharmacy was held this day at the Hall of the College. The President, Dillwyn Parrish, presided, and twenty-six members signed the register.

The minutes of the last stated meeting were read, and, on motion, adopted.

The minutes of the Board of Trustees since the last meeting of the College were read by Thos. S. Wiegand, in the absence of the Secretary of the Board, and, on motion, adopted.

These minutes make mention of the death of Charles H. Dingee, which occurred in December last. He was one of the first graduates of the College. A short sketch of his life will be found in an obituary notice in the February number of the JOURNAL of this year.

Thomas S. Wiegand, Librarian, read the following report of the year's operations. It was, on motion, accepted, and directed to be placed on the minutes.

PHILADELPHIA, March 29th, 1880.

The Librarian respectfully reports that the theses for the last year have been arranged and catalogued for binding; that there has been added to the Library of exchanges 22 volumes, by donation 30 volumes, by purchase 35 volumes. Of these last, the 10 volumes of the "Encyclopedia Britannica," purchased by funds left to the College for that purpose by our late fellow member, Algernon S. Roberts, form a most valuable addition to it. All of which is respectfully submitted.

T. S. WIEGAND, *Librarian.*

The Curator's report was read by Joseph P. Remington, and was, on motion, accepted.

The Curator would respectfully report that the additions to the Cabinet for the last year were not so numerous as in the preceding year. There were, however, three valuable cases of Indian drugs from Dr. Dymock, of Bombay, and a valuable callection from California received, specimens from which have been exhibited at some of the pharmaceutical meetings. These meetings, as in previous years, have been the means of contributing various specimens to the Cabinet.

JOSEPH P. REMINGTON, *Curator.*

Henry N. Rittenhouse, Chairman of the Committee on Publication, presented an account of the Treasurer of that committee, and also read the following report, which was, on motion, adopted. The statement of account accompanying this report exhibits a very satisfactory condition of affairs, and it is the general opinion of members that this committee are rendering a valuable service to the College.

PHILADELPHIA, March 29th, 1880.

To the Officers and Trustees of the Philadelphia College of Pharmacy:

GENTLEMEN.—The Committee of Publication respectfully report that the JOURNAL of the College has been regularly and promptly issued during the year just closed. The reports of the Editor and Business Editor, which accompany this, will give full details of the management.

Respectfully, HENRY N. RITTENHOUSE,
Chairman of Committee.

Professor Maisch, Editor of the JOURNAL, read the following interesting report of his labors during the past year. And as that valuable publication derives much of its interest from the contributions of members of the College and others interested in chemical and pharmaceutical science, it is to be hoped that the suggestions made by him will be followed up by everyone who may be able to contribute matter of a practical or scientific character. The report was, on motion, adopted, and ordered to be published in the minutes.

In presenting his annual report, the Editor is pleased to state that for the year ending with the present month a larger number of original papers were published in the JOURNAL than through the preceding year, though not quite as many as in some former years. During the past twelve months the total number of original papers was 84, or, on an average, 7 for each month, exclusive of original translations, abstracts, gleanings, editorials and other notices. Of the number stated, there were 35 papers on subjects relating to materia medica, 12 to chemistry, 30 to pharmacy, and 7 papers on other subjects of general interest. The papers were contributed by 60 authors, of whom three furnished 5 papers each, two 3 papers, eight 2 papers, and forty-seven 1 paper each. In this number are included abstracts from 19 theses, which is a gratifying increase over most of the preceding years.

The active members of the College who show a direct interest in the JOURNAL by contributing to it the results of their observations and experiments has remained the same (16) for some years past, except for the year ending March, 1879, when they were 13, with 22 papers. The number of papers contributed by them was 27 in March, 1876; 35 in 1877, 41 in 1878, and 25 in March, 1880. In addition to these, the Editor takes pleasure in acknowledging the kind offices of Professor Sadtler and of Mr. L. von Cotzhausen, who, for more than a year past, have furnished the JOURNAL regularly with abstracts from numerous chemical and pharmaceutical papers which could not be published in full. Under the direction of the Publishing Committee, the Editor has made further arrangements for the regular contribu-

tion to the JOURNAL of formulas and observations on new pharmaceutical preparations and improvements in processes and manipulations, as well as also for the contribution of new observations on the action, doses and therapeutical application of drugs, as far as they are of special interest to the pharmacist. While it is hoped that the usefulness of the JOURNAL will thereby be still further increased, the Editor ventures to urge upon the members, as he has done on former occasions, to communicate to him practical notes and observations made in the laboratory or at the prescription counter, so that they may be published for the benefit of the profession.

It is but proper that the Editor should again speak a good word in favor of the Pharmaceutical Meetings, at which practical and scientific topics are very properly brought forward. While these meetings are held under the supervision of the College, its members are expected to be especially interested in them; but all readers of the JOURNAL may, if they so desire, bring their investigations in this manner to general notice by addressing, in due time, either the registrar of these meetings or the editor of the JOURNAL. During the past year 21 papers have been read at the Pharmaceutical Meetings, and of this number several interesting essays have been furnished by non-members and by students of the College.

The Editor embraces this occasion to thank the various contributors and correspondents, and to express the hope in the continuance of their interest in the JOURNAL.

Respectfully submitted, JOHN M. MAISCH, *Editor.*

Thomas S. Wiegand, Chairman of the Committee on the Sinking Fund, reported that he had paid over to the Treasurer of the College the balance remaining in his hands. The report was, on motion, accepted.

The death of Samuel T. Jones, a member of the College, at the age of 38 years, from disease of the heart, was announced by Thomas S. Wiegand, who paid a tribute to his integrity and worth.

Professor Maisch announced the death of the following honorary members of the College:

Professor Carl Frederick Mohr, Ph.D., M.D., of the University of Bonn, which occurred September 28, 1879;

Professor J. B. Alphonse Chevallier, Honorary Professor of the Superior School of Pharmacy of Paris, on the 30th of November, 1879;

Professor H. A. L. Wiggers, Ph.D., Professor of Pharmacy at the University of Göttingen, on the 23d of January, 1880, obituary notices of all of whom have been published in the "Journal of Pharmacy."

A communication from the American Academy of Arts and Sciences of Boston, relative to the celebration of its one hundredth anniversary on the 26th of May, 1880, was read, conveying an invitation to this College to send one or more delegates to attend the celebration and reception, with a request that an answer be sent to the Secretary of the Committee. On motion of Charles Bullock, Professor Robert Bridges and Professor Samuel P. Sadtler were appointed delegates to attend the celebration.

The Treasurer reported a number of members as being five years in arrears to the College. A motion was made and adopted, that in accordance with the custom heretofore pursued, their names be stricken from the roll of members.

This being the time for the annual election, the Chair appointed Edward C. Jones and William B. Thompson tellers, who, after counting the ballots, announced the election of the following officers, trustees and standing committees, viz.:

President—Dillwyn Parrish.
First Vice President—Charles Bullock.
Second Vice President—Robert Shoemaker.
Treasurer—Samuel S. Bunting.
Recording Secretary—William J. Jenks.
Corresponding Secretary—Alfred B. Taylor.
Board of Trustees—for three years—John M. Maisch, Robert England, Samuel P. Sadtler.

Publication Committee—John M. Maisch, Henry N. Rittenhouse, Thomas S Wiegand, James T. Shinn, Charles Bullock.
Sinking Fund Committee—Thomas S. Wiegand, T. Morris Perot, James T. Shinn.
Editor—John M. Maisch.
Librarian—Thomas S. Wiegand.
Curator—Joseph P. Remington.

There being no further business, on motion, adjourned.

WILLIAM J. JENKS, *Secretary.*

MINUTES OF THE PHARMACEUTICAL MEETING.

PHILADELPHIA, April 20th, 1880.

The meeting was called to order by asking Mr. W. B. Thompson to preside; the minutes of the last meeting having been read, were, on motion, approved.

Donations to the cabinet and library being the first business in order, Prof. Maisch presented a copy of the Proceedings of the American Pharmaceutical Association for 1879. Dr. Chas. L. Mitchell presented a specimen of what is sometimes known in commerce as gum-hogg, it being used by paper stainers in making what is called marble paper. The thanks of the meeting were tendered to the donors for them.

Dr. Mitchell read a paper upon the *gum-hogg* (see page 250). This elicited some remarks descriptive of various kinds of gum, and particularly tragacanth of low grades with which, in Prof. Maisch's opinion, this so-called gum-hogg is identical.

The Registrar read a short note on *spiritus ammoniæ aromaticus*, from W. S. Plumer, Jr., Ph.G., as follows:

"In preparing spiritus ammoniæ aromaticus there is frequently a heavy precipitate; some of the text books state that it is due to the insolubility of carbamate of ammonium, generally found in commercial carbonate, in the alcohol. My plan in making this preparation is to dissolve the carbonate of ammonium in the water o ammonia and water, and allow it to stand for at least a week in a closely stoppered bottle; then having made a solution of the oils in the alcohol, add the ammonia solution to the solution of the oils quickly; if this is done there will be no precipitate whatever."

A paper upon *ethyl bromide* was read by Dr. L. Wolff, and is published upon page 241. The fatal case in which the ethyl bromide had been employed, mentioned in Dr. Wolff's paper, was discussed, after which Prof. Remington read a paper upon the same subject (see page 248). The papers read were referred to the publication committee, and the thanks of the meeting were tendered to the gentlemen for their very interesting communications.

Prof. Remington exhibited a little card giving the three metrical units employed by pharmacists, viz.: those of length, capacity, and weight. The card is a square, having for its side one decimeter, or one-tenth the unit of measure of length, the meter; a cube of the decimeter gives the unit of capacity, or liter; a cube with sides measuring one-tenth of a decimeter being a cubic centimeter, filled with distilled water, gives the unit of weight one gram; the card itself weigh snearly five grams; upon the reverse of the card is a device to assist those not familiar with the divisions and increments of the system to remember them.

A member present asked if any of the members had any experience in preparing *kumyss*, to which there were two or three responses, but no exact formula was given.

There being no further business, the meeting adjourned.

THOS. S. WIEGAND, *Registrar.*

PHARMACEUTICAL COLLEGES AND ASSOCIATIONS.

Pharmacy at Saratoga Springs.—The American Pharmaceutical Association having selected Saratoga Springs, N. Y., as the place for holding the next annual meeting, the pharmacists of that celebrated watering place have already commenced making preparations with the view of making the meeting as profitable and enjoyable to the visiting members as possible. A meeting was held April 23d at the Arlington House, at which the Local Secretary, Mr. Chas. F. Fish, presided, Mr. E. L. Fish acting as secretary. The following committees were appointed:

Committee on Finance—Messrs. Chas. F. Fish, J. M. Colcord, F. H. Hathorn, Wells and Henry Lawrence.

Excursions and Entertainment—Messrs. Wells, Schuyler, Johnson and Lancashire.

Railroad and Transportation—Messrs. George H. Fish, Thurber, Waring and Menges.

Printing—Messrs. Pennington, Moody, Settle and Deal.

Exhibition—Messrs. J. M. Colcord, Schermerhorn, Chas. F. Fish, Wells, Henry Lawrence, Moriarta, Derrick and Mingay.

Hotels—Messrs. Mingay, Cranmer, Collins, Wells, Moody and Baldwin.

Express—Messrs. Henry Smith, Barnes and E. L. Fish.

Executive Committee—Messrs. Chas. F. Fish, J. M. Colcord, Mingay, Schermerhorn, Wells, Cranmer, and a representative of each spring company.

A large and well-appointed hall has already been secured in which to hold the meeting, and in the immediate neighborhood a large and well-lighted building has been selected for the exhibition of articles of pharmaceutical interest. The meeting promises to be attended by many members with their families, and exhibits have already been promised by several prominent firms.

The local secretary has thus far secured free transportation for the goods intended for exhibition in Saratoga by the Hudson River Steamboat Lines and by the Delaware and Hudson Canal Company's railroad. An abatement in freight rates has been obtained from several railroads, and negotiations with other roads are in progress. The principal manufacturing cities and ports of importation will thus secure desirable facilities; and since it is expected that the express companies will grant similar liberal terms for forwarding smaller packages intended for exhibition, it is hoped that this feature connected with the annual meetings of the Association will be as varied and interesting as heretofore.

Saratoga being accessible during the summer and autumn from all parts of the United States and Canada by a variety of routes at low excursion rates, there will be no difficulty in arranging excursions from all principal cities; and, in addition thereto, the local secretary is endeavoring to obtain favorable terms from the various railroads and steamboat lines leading towards Saratoga. We understand that several short excursions, at a moderate cost, are contemplated after the meeting

shall have adjourned, among them one to Au Sable Chasm, including a sail on the beautiful Lake Champlain, and, on the return trip, a visit to several interesting points on Lake George.

Philadelphia College of Pharmacy.—The usual summer excursions in botany commenced April 14th, and are for the present year in charge of Mr. John Cook. As heretofore, they take place on the afternoon of every Wednesday.

Massachusetts College of Pharmacy.—The twelfth commencement was held at Union Hall on Thursday evening, April 15th, when the President, B. F. Stacey, conferred the degree of Graduate in Pharmacy upon the following gentlemen:

John Walter Bachelder (*Gelsemia and Gelsemic Acid*), James Sylvester Barry (*Salicylate of Sodium*), George Richard Bell (*Iodoform*), Charles Andrew Boyden (*Erythroxylon Coca*), Franklin Edward Boyden (*An Ideal Pharmacy*), Joseph Allen Chapin (*Boracic Acid*), George Sumner Churchill (*Subnitrate of Bismuth*), Frank Clough (*Oleoresin of Capsicum*), Charles Louis Curtis (*Eremocarpus Setigerus*), Willard Henry Cutting (*Acer Saccharinum*), Azro Milton Dows (*Rhamnus Frangula*), Eugene Hamblet (*Benzoic Acid and its Officinal Source*), Frederic Albert Jewett (*Chlorate of Potassium*), James M. Kerrigan (*Oxide of Zinc*), Elie Henry La Pierre (*Tartaric Acid*), Charles James Peters (*Potassic Iodide*), Alfred Pillsbury, Jr. (*Soap Tree Bark*), George Henry Sanderson (*Cannabis Indica*), William Edward Turple (*Nitrite of Amyl*).

A certificate of proficiency was awarded to Ida Rebecca Brigham, M. D. (*Anacardium occidentale*). Prizes consisting of books were presented in the department of pharmacy, for best term recitations, to F. A. Jewett (senior class) and Chas. M. Frye (junior class); and for best final examination, to G. H. Anderson (ssnior class) and H. F. Totman (junior class).

New York College of Pharmacy.—The lectures on Botany by Prof. Alphonso Wood will commence May 5th, and excursions to the fields and forests in the vicinity will occasionally be undertaken.

National College of Pharmacy at Washington, D. C.—The annual meeting of the College was held April 5th. The reports from officers and committees made a very favorable showing of the affairs of the College. The graduation of students will not take place until after the close of the spring course in analytical chemistry.

The following officers were elected for the ensuing year: President, Mr. J. D. O'Donnell; Vice-Presidents—Mr. G. G. C. Simms, Mr. R. A. Bacon; Secretary, Mr. Charles Becker; Treasurer, Mr. John A. Milburn; additional Trustees—Messrs. W. S. Thompson, R. B. Ferguson, H. E. Kalusowski, W. G. Duckett, J. D. Franzoni, Karl Kulberg and Wash. C. Milburn.

Alumni Association Louisville College of Pharmacy.—At the annual meeting held March 23d the following officers were elected: President, J. A. Flexner; Vice-Presidents—Emil Scheffer, Jr., J. C. Loomis; Recording Secretary, Otto E. Mueller; Corresponding Secretary, Albert J. Schoettlin; Treasurer, B. Buckle; Executive

Board—John F. Rudell, O. A. Beckman, Wm. Tafel, George Stauber, Henry Buschemeyer, Jr.

Pharmaceutical Society of Great Britain.—At the Pharmaceutical meeting held March 3d, Mr. G. F. Schacht in the chair, Prof. Redwood read a very interesting paper on *the diffusive properties of some preparations of iron* (see p. 265). In the discussion following, for which we cannot make room, Prof. Attfield said that he adhered to Graham's views and regarded it not improbable that the scaly preparations of iron would be found to be crystalline. Mr. Martindale referred to the activity of basic oxychloride of iron, prepared by dissolving pasty oxide of iron in perchloride solution, and regarded the inefficiency of dialyzed iron as "not proven."

Dr. Symes stated that his experiments were performed in a different manner from those made by Prof. Redwood, namely, by digesting at 100°C. a mixture of dialyzed iron and peptone, in a dialyzer, when iron was found to diffuse through.

After some further discussion, in which it was stated that commercial ammoniocitrate of iron usually contained more than the minimum quantity (27 per cent.) of oxide allowed by the British Pharmacopœia, the meeting adjourned.

EDITORIAL DEPARTMENT.

Tests for Arsenic.—The following note in reference to the statements made on page 194 of our last number explains itself. We are not prepared to adopt the conclusion arrived at by our correspondent.

To the Editor of the American Journal of Pharmacy:

In an editorial note on my article in the April number relative to tests for arsenic, regret is expressed that I do not give the alleged authority for the solubility of antimony in hypochlorite of sodium. Not being able to recall the authority in question I wrote to Mr. James, the attorney who conducted the cross-examination, and will quote from his letter in reply:

"The book I read from on that subject (the solubility of antimony in hypochlorite of sodium) was 'Wharton and Stillé's Medical Jurisprudence,' vol. 2, paragraph 429, where it is stated that hypochlorite of sodium dissolves the arsenical spot, but that antimonial spots resist its effect, *unless they are small and of a dull appearance, when they will be dissolved.*"

This certainly brings the subject down to a fine point, and the cautious analyst will have to be sure that the arsenical spots are not "small and of a dull appearance," which in all cases is not possible. Hence, we believe that the hypochlorite of sodium is an unreliable test for the spots on porcelain. PHIL. HOGLAN.

Newcomerstown, O., April 20, 1880.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

Proceedings of the American Pharmaceutical Association at the Twenty-seventh Annual Meeting, held in Indianapolis, Ind., September, 1879. Philadelphia: Sherman & Co., printers, 1880. 8vo, pp. 910. Price, bound in cloth, $7.50.

Having in the October number given a condensed account of the transactions of the last meeting of the American Pharmaceutical Association, it remains now

merely to call attention to this publication, in which, as usual, the very full and carefully arranged report on the progress of pharmacy is a prominent feature, occupying more than one-half (524 pages) of the book. Of great interest is also the report on the drug market, which is supplemented by a comprehensive report on the drug market of San Francisco and the resources of California, from the pen of Mr. Jas. G. Steele, covering nearly 100 closely printed pages. The papers read at the meeting were not quite as numerous as on some former occasions, but they will be found of great interest and even importance. On reading the graphic descriptions in Mr. Wellcome's paper, "A Visit to the Cinchona Forests of South America," it will be a source of regret that his other essay, relating to the practice of medicine and pharmacy in Peru, was lost and could not be prepared again for this volume.

The frontispiece is a well-executed artotype of the late Eugene L. Massot, of St. Louis, a merited tribute to the memory of a worthy follower of pharmacy.

It is to be regretted that the short-hand report of the discussions is uncommonly meagre, as compared with previous years. In all other respects we believe the volume compares favorably with the preceding ones, and is more handy than others of a similar size, in consequence of the selection of a paper more suitable for voluminous books. The volume may be obtained from the Permanent Secretary.

The Microscope and Microscopical Technology. By Heinrich Frey, Professor of Medicine in the University of Zurich. Translated and edited by Geo. R. Cutter, M.D., etc. Second edition. New York: William Wood & Co., 1880. 8vo, pp. 660.

The original work in German is well known and highly valued by microscopists conversant with the German language. The labor of translation of such a work is not an easy one; but it has been well done by the editor.

The description of the microscope, with its various accessories, is very instructive, and the means for using the instrument, for preparing microscopic objects, for mounting them, etc., are fully described. The information gained in this direction by a careful perusal of the work is considerable; and the practical hints given on almost every page of the work are such as will be duly appreciated by not only the novice, but even by those who are familiar with the use of the microscope.

The work treats chiefly of the tissues, secretions and excretions of animals, and is therefore primarily intended for the use of the physician and the student of anatomy and physiology; but its practical scope is by far wider, and the student of general as well as special biology will find it a most welcome addition to his works of instruction and reference in a branch of investigation by means of an instrument which "has conquered a new world of minuteness for natural science."

Paper, illustrations and the typographical outfit in general are very commendable.

A Practical Handbook of Medical Chemistry applied to Clinical Research and the Detection of Poisons. By Wm. H. Greene, M.D., Demonstrator of Chemistry in the Medical Department of the University of Pennsylvania, etc. Philadelphia: Henry C. Lea's Son & Co., 1880. 12mo, pp. 310. Price $1.75.

Good works on medical chemistry are by no means numerous. Notwithstanding

the many patient investigations undertaken by competent men, the various transformations of organic compounds in the living body are mostly involved in obscurity, so that biological chemistry can scarcely as yet be ranked with the exact sciences. It is for this reason the more important that what has been accomplished should be presented to the student, not as isolated facts, but in groups as natural as the nature of the numerous principles will admit. The little work before us is one which we think will be studied with pleasure and profit.

After a brief chapter on manipulations, the organic proximate principles taking part in the animal economy are described, commencing with the fatty and other acids, which are followed by the sugars, the principles found in urine, flesh and bile, the albuminoid and allied bodies, and the animal pigments. Of each principle there is usually given its origin, mode of preparation, properties and tests, and in case two or more resemble each other, the differences are pointed out. The descriptions, though brief, are clear, and in most cases sufficient for the purpose; frequently, also, further elucidated by acceptable wood-cuts, illustrating the shape of crystals, apparatus, etc. Where briefness is an object, certain portions may always be picked out by the critical that would seem to deserve more detailed consideration. In this respect, the book will, in nearly all cases, meet general approval. Among the few instances noticed by us, where some additional facts appear to be deserving of greater detail, are the action of the various ferments in the presence of acids and alkalies.

Part II treats of the analysis of secretions, excretions, etc. The author's familiarity with his subject is everywhere evident in the selection of the processes for separation, identification and estimation. The same is also observed in Part III, which treats of the detection of poisons, and is, as the author tells us in the preface, modeled on the plan of Bowman's chemistry.

We regard the work not only very well adapted to the wants of the medical student, but we are convinced that the physician and the pharmacist will find it very useful in giving reliable advice in the examination of urine, calculi, blood, milk and other animal matters, and in the detection and identification of poisons. In usefulness, as well as in appearance, the work will be a desirable addition to the medical and pharmaceutical library.

A Guide to the Practical Examination of Urine, for the use of Physicians and Students. By James Tyson, M.D., Professor of General Pathology and Morbid Anatomy in the University of Pennsylvania, etc. Third edition. Philadelphia: Lindsay & Blakiston. 1880. 12mo, pp. 183. Price, $1.50.

It is little more than a year ago since we reviewed the second edition of this work, and it gives us pleasure to state that the present revised one deserves all the praise accorded to the preceding.

The Art of Perfumery, and the Methods of Obtaining the Odors of Plants, etc. By G. W. Septimus Piesse, Ph.D., F.C.S., etc. Fourth edition. Philadelphia: Presley Blakiston. 1880. 8vo, pp. 506.

Piesse's "Perfumery" is too well known, and has been for such a long time in the

hands of those interested, that scarcely more seems to be necessary than to mention the fact that a new and improved edition has made its appearance. It treats of the growth and general flower-farm system of raising fragrant herbs; of the method of obtaining the odors; of the manufacture of perfumes for the handkerchief; scented powders, odorous vinegars and salts; snuff, dentifrices, cosmetics, perfumed soaps, etc., and gives some formulas for preparing artificial fruit essences. The work has been much improved by the addition of all recent observations of importance bearing on the subject, and contains a large number of good illustrations of articles and apparatus used in the preparation of perfumery. The new edition will doubtless be used with the same profit and instruction that was obtained from the older ones.

Headaches; their Nature, Causes and Treatment. By William H. Day, M.D., etc. Third edition, with illustrations. Philadelphia: Lindsay & Blakiston. 1880. 12mo, pp. 322. Price, $2.00.

In a little over two years two editions of this little work have been exhausted, which proves that this monograph has been well received by the profession. The new edition is essentially the old one, with the addition of several pages of new matter. It will doubtless be found as convenient for use and instructive in practice as the two preceding editions.

Sea-air and Sea-bathing. By John H. Packard, M.D., Surgeon to the Episcopal Hospital. Philadelphia: Presley Blakiston. 1880. 16mo, pp. 124. Price, 50 cts.

As one of the series of American Health Primers this little volume is deservedly in good company, and since the subject discussed by it is one in which nearly everybody is interested, it will be welcomed by many as a guide or for suggestions while visiting the seashore, either in summer or winter.

Ein Beitrag zur Biologie einiger Schizomyceten. Von H. v. Boehlendorff. Dorpat, 1880. 8vo, p. 51.

A Contribution to the Biology of Several Schizomycetes.

This inaugural dissertation describes the development of bacteria under very varying conditions.

Ueber die Wirkung der Antiseptica auf ungeformte Fermente. Von Iwan Wernitz. Dorpat, 1880. 8vo, p. 93.

On the Effect of Antiseptics upon Formless Ferments.

The investigations relate to the so-called chemical ferments, such as emulsin, myrosin, diastase, ptyalin, pancreatin, pepsin, etc.

Untersuchungen über die Wurzelfasern von Rhinacanthus communis. Von Dr. P. Liborius. Dorpat, 1880. Pp. 12.

Investigations on the Rootlets of Rhinacanthus communis, *Nees.*

This plant belongs to the Nat. Ord. Acanthaceæ, is indigenous to Japan and

China, and is known in India as *guikarnee*. The rootlets, which are sold in Hongkong at $2 per pound, are used in preparing a bright red tincture with 5 parts of strong alcohol. The tincture known in the East as *ringworm tincture* is regarded as an effectual remedy against ringworm and other cutaneous diseases. The author isolated from the drug 1·87 per cent. of a dark red resin-like principle, *rhinacanthin*, which is not a glucoside, is soluble in alcohol and ether, and dissolves in petroleum benzin and chloroform with a yellow color. It is present in the milk juice of the bark, and represents the antiparasitic action of the drug.

Quantitativ-chemische Untersuchungen über die Zusammensetzung der Kork-, Bast-, Sclerenchym- und Markgewebe. Von Joh. Koroll. Dorpat, 1880. 8vo, pp. 52.

Quantitative Chemical Examinations on the Composition of the Tissues of Cork, Liber, Sclerenchyma and Pith.

The substances examined are shells of hazel nuts and walnuts, liber of the linden and elm, root of chicory and turnip, pith of elder and leathery cork of birch.

A Catalogue of the Forest Trees of North America. By Chas. S. Sargent, Arnold Professor of Agriculture in Harvard College. Washington: 1880. 8vo, pp. 93.

This is one of the publications issued in reference to the pending tenth census of the United States, of which this catalogue will form a part. Its preliminary publication was made with the view of obtaining reliable information from all parts of the country in regard to geographical distribution, region, elevation, soil, dimensions, local names, economic uses, products, etc., of each species. It is to be hoped that botanists, pharmacists and others interested in this matter will aid the special agent of the tenth census, Prof. Sargent, so as to make the report as complete as possible.

Adulteration of Food. By Albert R. Leeds, Ph.D., Professor of Chemistry in the Stevens Institute of Technology.

A reprint from the third report of the New Jersey State Board of Health, giving the results of numerous analyses, and advocating suitable legislation, with the view of restraining the evil within as narrow limits as possible.

Chemische Beiträge zur Pomologie. Von Theodor Pfeil. Dorpat, 1880. Pp. 46.

Chemical Contributions to Pomology.

A very interesting and instructive examination into the proximate constituents of the apple during the period of development and ripening. The weight of the fruit increased from 1·80 gram (June 8th) to 89·10 grams (Aug. 15th), during which period the weight of sugar increased from 0·037 to 4·366 grams, free (malic) acid from 0·031 to 0·673 gram, starch from 0 to 0·201 gram, etc.

Premières études sur l'Erythroxylon Coca. Par Victor Truphème. Montpellier, 1879. 8vo, pp. 53.

A very creditable monography on coca, giving the botanical history, its production, commerce, general characters, chemistry, physiological action, pharmaceutical preparations and literature.

Du Thapsia Garganica on Bounêfa des Arabes. Par Charles Blanchet. Montpellier, 1880. 8vo, pp. 73.

This essay contains the history of the species named, its uses and chemistry. The author has also investigated a false thapsia, which is the root of Ferula nodiflora, *Lin. s.*, Fer. communis, *Desf.*, and described a number of allied species.

Sixteenth Annual Report of the Alumni Association, with the exercises of the Fifty-Ninth Commencement of the Philadelphia College of Pharmacy. 1880. 8vo, pp. 59.

The pamphlet contains various addresses, minutes, lists of members and graduates, etc. The officers for the current year are Hugh Campbell, President; Wm. W. Moorhead and Henry Trimble, Vice-Presidents; W. E. Krewson (8th and Montgomery Av'e.) Recording Secretary; L. E. Sayre, Corresponding Secretary, and Edward C. Jones (15th and Market Sts.) Treasurer. Copies of the various annual reports may be obtained from the Recording Secretary or Treasurer on enclosing to either one of these officers 10 cts. per copy, to pay for postage, etc.

Twenty-third Annual Report of the Council of the Pharmaceutical Society of Victoria, 1880, with list of members and honorary members. Melbourne, 1880.

First Report of the Pharmacy Board of Victoria. Melbourne, 1880.

There are now 607 pharmaceutical chemists on the register. Thus far eight convictions under the pharmacy act have been obtained for carrying on business without being registered.

The Pharmaceutical Register for 1879. Melbourne, 1880.

It contains the list of registered pharmacists, apprentices, etc., with residence, date of qualification, etc.

Nineteenth Annual Report of the Philadelphia Drug Exchange. 1880.

The officers for the current year are H. B. Rosengarten, President; John Fergusson, Vice-President; H. C. McIlvaine, Secretary, and Edward H. Hance, Treasurer.

Thirteenth Annual Report of the Alexian Brothers Hospital, Chicago, Ills., for the year ending Dec. 31st. 1879.

Muscle-Beating; or active and passive Home Gymnastics for healthy and unhealthy people. By C. Klemm, Manager of the Gymnastic Institution in Riga. With illustrations. New York: M. L. Holbrook & Co. 1879. Pp. 56. Price 30 cts.

Electricity in Medicine and Surgery, with Cases to Illustrate. By John J. Caldwell, M.D., Baltimore, Md.

Reprint from "Gaillard's Medical Journal," March.

Kreuznach, its Celebrated Bromide-ioduretted Elizabeth Spring and Mother-lye. Kreuznach, 1880.